2006 STEERING

Power Steering System - Lucerne

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Adjuster Plug Lock Nut	68 N.m	50 lb ft
Cylinder End Fittings	27 N.m	20 lb ft
Inner Tie Rod to Gear	100 N.m	74 lb ft
Intermediate Steering Shaft Pinch Bolt	47 N.m	37 lb ft
Outer Tie Rod End to Knuckle Nut		
• First Pass	30 N.m	22 lb ft
• Second Pass	+180 degrees	
Power Steering Flow Control Valve	75 N.m	55 lb ft
Power Steering Gear Heat Shield	9 N.m	80 lb in
Power Steering Hose Fittings	30 N.m	22 lb ft
Power Steering Pressure Hose Banjo Bolt (RPO L26)	55 N.m	41 lb ft
Power Steering Pressure Hose Bracket Nut	9 N.m	80 lb in
Power Steering Pump Bracket Bolt (RPO LD8)	50 N.m	37 lb ft
Power Steering Pump Mounting Bolts (RPO L26)	25 N.m	18 lb ft
Power Steering Return Hose Bracket Bolt	9 N.m	80 lb in
Steering Gear Mounting Bolts	95 N.m	70 lb ft
Valve End Fittings	17 N.m	13 lb ft

POWER STEERING PUMP SPECIFICATIONS

Power Steering Pump Specifications

Engine Code	Engine Size	High Flow		Pressure Relief	
		LPM	GPM	kPa	PSI
L36 L67	3.8L 3.8L SC	7.4/8.9	1.9/2.4	9308/9998	1350/1450

COMPONENT LOCATOR

POWER STEERING GEAR DISASSEMBLED VIEW (MAGNASTEER)

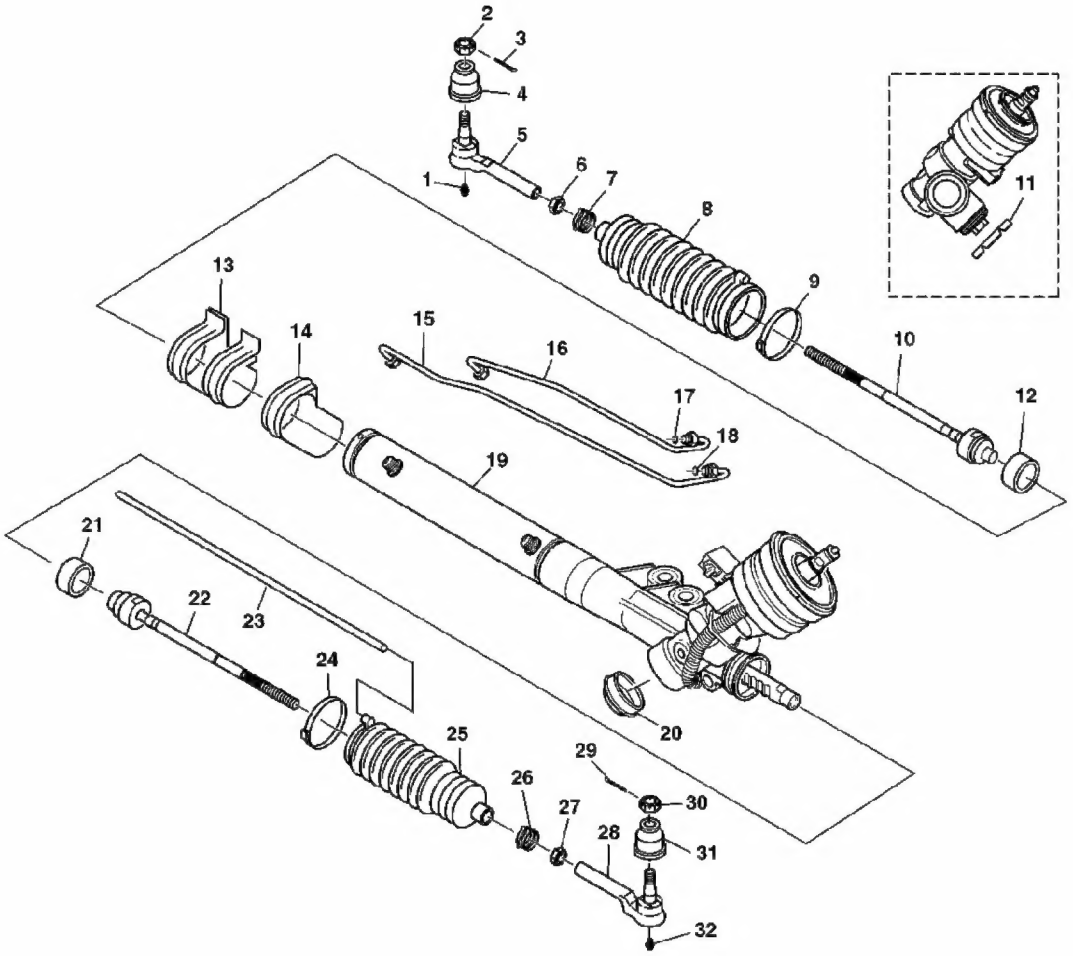


Fig. 1: Identifying Magnasteer Power Steering Gear
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 1

Callout	Component Name
1	Lubrication Fitting
2	Hexagon Slotted Nut
3	Cotter Pin
4	Tie Rod Seal
5	Outer Tie Rod
6	Hexagon Jam Nut
7	Tie Rod End Clamp
8	Rack and Pinion Boot
9	Large Boot Retaining Clamp

10	Hexagon Jam Nut
11	Adjusted Plug Clamp
12	Shock Dampener Ring
13	Large Boot Retaining Clamp
14	Mounting Grommet
15	Cylinder Line (LH)
16	Cylinder Line (RH)
17	O-ring Seal
18	O-ring Seal
19	Rack and Pinion Gear Assembly (Partial)
20	Dust Cover
21	Shock Dampener Ring
22	Inner Tie Rod
23	Breather Tube
24	Large Boot Retaining Clamp
25	Rack and Pinion Boot
26	Tie Rod End Clamp
27	Hexagon Jam Nut
28	Outer Tie Rod
29	Cotter Pin
30	Hexagon Slotted Nut
31	Tie Rod Seal
32	Lubrication Fitting

POWER STEERING PUMP DISASSEMBLED VIEW (CB SERIES PUMP)

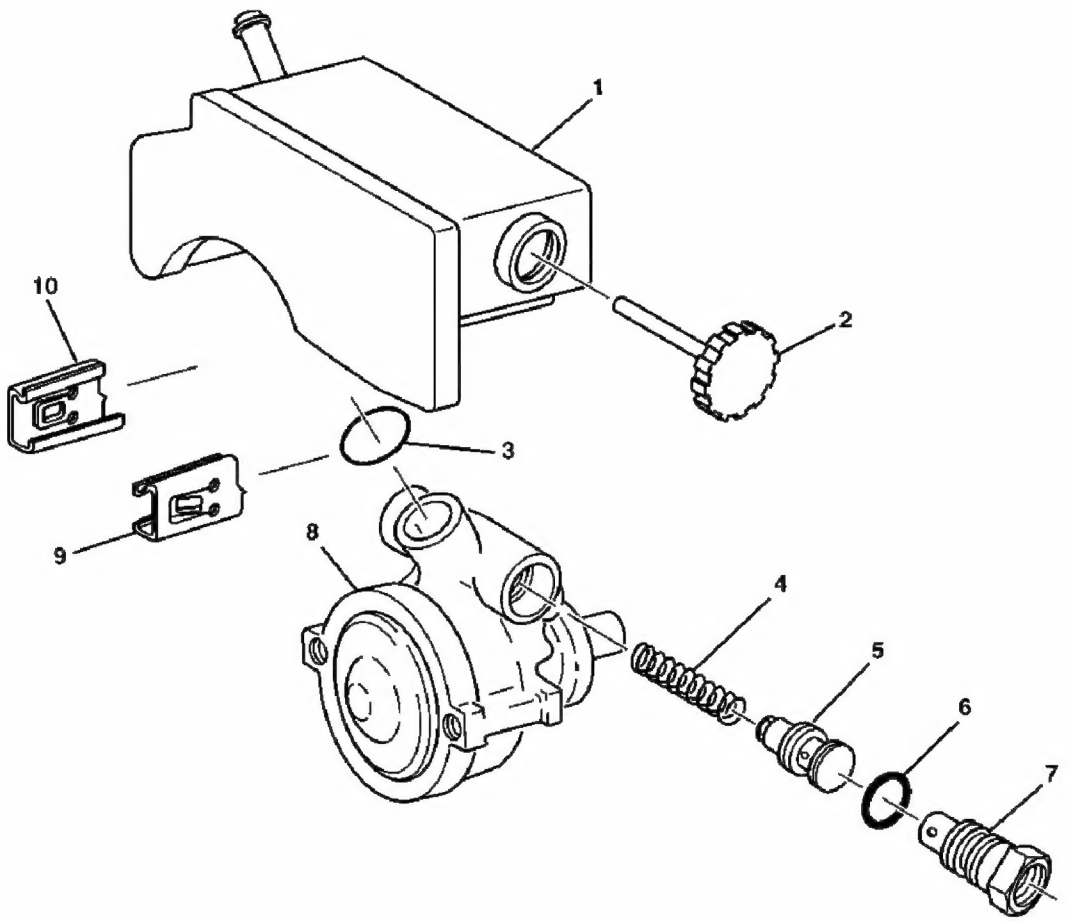


Fig. 2: Exploded View Of Power Steering Pump Components (CB Series)
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 2

Callout	Component Name
1	Hydraulic Pump Reservoir Assembly (Typical)
2	Reservoir Capstick Assembly
3	O-Ring Seal
4	Flow Control Spring
5	Control Valve Assembly
6	O-Ring Seal
7	O-Ring Union Fitting
8	Hydraulic Pump Housing Assembly
9	Reservoir Retaining Clip (RH)
10	Reservoir Retaining Clip (LH)

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - POWER STEERING SYSTEM (W/O ELECTRO-HYDRAULIC STEERING)

Begin the system diagnosis by reviewing the system Description and Operation. Refer to **Power Steering System Description and Operation (w/o Electro-Hydraulic Steering)**. Reviewing the Description and Operation information will help you determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the Description and Operation information will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Power Steering System** in order to identify the correct procedure for diagnosing the system and where the procedure is located.

SYMPTOMS - POWER STEERING SYSTEM

IMPORTANT: Review the system description and operation in order to familiarize yourself with the system functions. Refer to Power Steering System Description and Operation (w/o Electro-Hydraulic Steering).

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the power steering system.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Inspect for leaking power steering components. If necessary, refer to **Power Steering Fluid Leaks**.
- Verify the power steering fluid level per operating specification. Refer to **Checking and Adding Power Steering Fluid**.
- Inspect the power steering fluid for the following indications of contamination:
  - Milky fluid - water
  - Brown fluid - burnt
  - Debris in fluid - plastic or dirt
- If necessary, flush the power steering system. Refer to **Power Steering System Flushing**.

Symptoms List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- **Power Steering Fluid Leaks**
- **Rattle, Clunk or Shudder Noise from the Power Steering System**
- **Whine or Growl Noise from the Power Steering System**
- **Steering Effort Hard or Too Easy in One or Both Directions**

POWER STEERING SYSTEM TEST

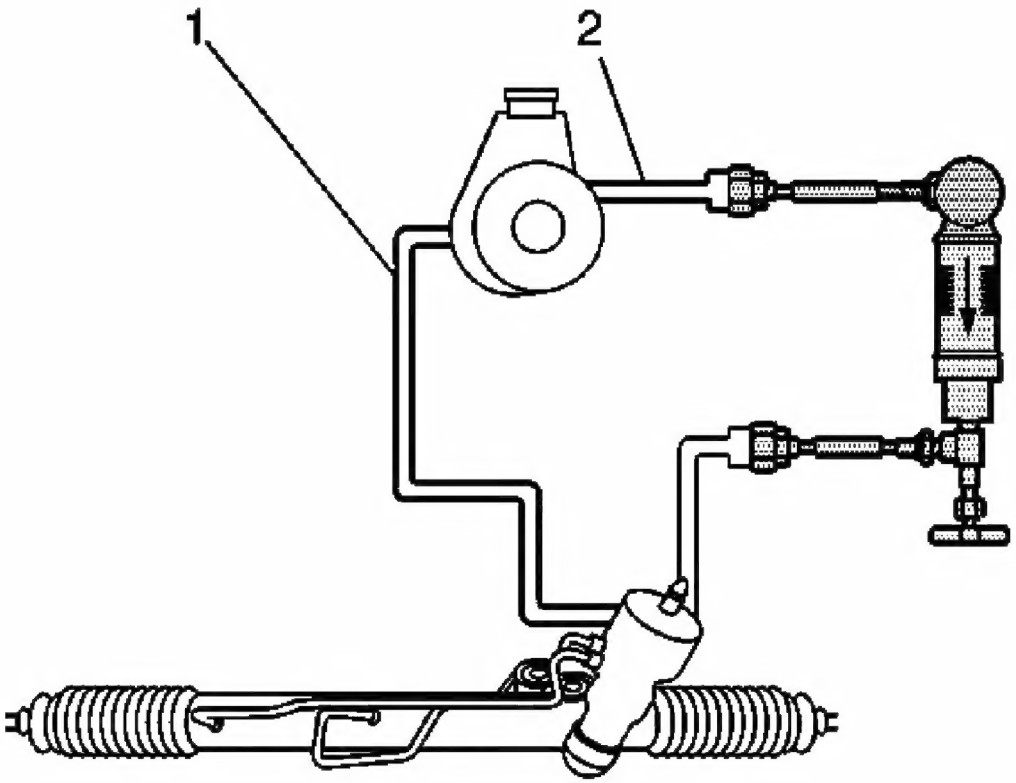


Fig. 3: Testing Rack and Pinion System Pressures
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
1	Power Steering Return Hose
2	Power Steering Pressure Hose

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5: This step tests the system for restrictions.

7: This step tests the following components for the following conditions:

- The pump for internal leaks
- The power steering pipes for kinks

8: This step tests the ability of the pump to regulate flow at maximum pressure.

10: This step tests the ability of the pump to regulate flow under normal operating conditions.

12: This step tests the internal components of the pump and the gear.

Power Steering System Test

Step	Action	Values	Yes	No
DEFINITION: The Power Steering System Test Procedure will perform the following functions: • Test the operation of the hydraulic power steering system. • Test the operation of the power steering pump and power steering gear. • Identify restrictions in the system.				
1	Inspect the power steering fluid for the following indications of contamination: • Milky fluid - water • Brown fluid - burnt • Debris in fluid - plastic or dirt Is the fluid free of contamination?	-	Go to **Step 3**	Go to **Step 2**
2	Flush the power steering system. Refer to **Power Steering System Flushing**. Did you complete the procedure?	-	Go to **Step 3**	-
3	**IMPORTANT:** **In order to accurately diagnose the system, the malfunction must be present during the test procedure.** Attempt to duplicate the condition.Is the condition present? 1. Turn the ignition switch to the OFF position.	-	Go to **Step 4**	System OK

	2. Place a drain pan under the vehicle in order to catch any power steering fluid. 3. Disconnect the power steering pressure pipe/hose from the power steering pump or the power steering gear as necessary. Attempt to duplicate the condition. Is the condition present?		Go to **Step 4**		System O
4	4. Install the **J 44721** Power Steering System Analyzer. See **Special Tools**. 5. Fill the power steering system. Refer to **Checking and Adding Power Steering Fluid**. Did you complete the installation?	-	Go to **Step 5**		-
5	1. Fully open the **J 44721** valve. See **Special Tools**. 2. Start the engine. **NOTE:** **Refer to Steering Wheel in the Full Turn Position Notice .** 3. Turn the steering wheel and BRIEFLY hold the steering wheel against the steering stop in order to release any trapped air from the system. 4. Inspect and ensure that all of the power steering pipe/hose connections are not leaking. 5. Making sure the steering wheel is OFF the steering stop, observe the pressure reading. Is the pressure reading greater than the specified value? **IMPORTANT:**	1379 kPa (200 psi)	Go to **Step 6**	Go to **Step 7**	
3	**IMPORTANT:** **In order to accurately diagnose the system, the malfunction must be present during the test procedure.** Attempt to duplicate the condition. Is the condition present?	-	Go to **Step 4**		System O

6 5	**IMPORTANT:** **Do not leave the valve closed for more than 5 seconds or internal pump damage could accrue.** **IMPORTANT:** **Do not operate the power steering system with the J 44721 valve fully closed. Turn off the engine IMMEDIATELY.** Fully open the **J 44721** valve. See **Special Tools**. Locate and repair the restriction. Did you complete the repair?	- 1379 kPa (200 psi)	Go to **Step 18**		-
	1. Allow the engine to run until the engine reaches full operating temperature. 2. Record the pressure reading and flow reading.				
7	3. Partially close the **J 44721** valve until the system pressure reaches the specified value, then record the FLOW reading. See **Special Tools**. 4. Subtract second flow reading from the first flow reading. Is the flow DECREASE greater than 3.8 L (1 gal) per minute?	4827 kPa (700 psi)	Go to **Step 13**		Go to **Step 8**
8 9	**IMPORTANT:** **Do not leave the valve closed for more than 5 seconds or internal pump damage could accrue.** Fully close then open the **J 44721** valve 3 times. See **Special Tools**. Record all of the high pressure readings. Refer to **Power Steering Pump Specifications** for power steering system pressure relief specifications. Are the three high pressure readings within specifications? Are the three high pressure readings within 245 kPa (50 psi) of each other? 1. Increase the engine speed to approximately 1500 RPM. 2. Record the flow reading.	- -	Go to **Step 9** Go to **Step 10**		Go to **Step 15** Go to **Step 14**

10 8	Refer to **Power Steering Pump Specifications** for pressure specifications. n the **J 44721** valve 3 times. See **Special Tools**. Record all of the of the high pressure readings. Refer to the **Power Steering Pump Specifications** and the maximum flow specification more than 3.8 L (1 gal) per minute?	-	Go to **Step 11**	Go to **Step 13**
11 9	Are the three high pressure readings within 345 kPa (50 psi) of each other?	-	Go to **Step 9** Go to **Step 10**	Go to **Step 15** Go to **Step 14**
12	**Refer to Steering Wheel in the Full Turn Position Notice .** Turn the steering wheel from steering stop to steering stop and record the FLOW readings at each stop.Is the flow LOWER than 3.8 L (1 gal) per minute?	-	Go to **Step 18**	Go to **Step 17**
13	Replace the power steering pump. Refer to **Power Steering Pump Replacement (LD8)** or **Power Steering Pump Replacement (L26)**. Did you complete the replacement? 1. Remove the power steering pump flow control valve. Refer to **Power Steering Pump Flow Control Valve Replacement - On Vehicle (L26)** or **Power Steering Pump Flow Control Valve Replacement - On Vehicle (LD8)**. 2. Inspect the flow control valve. If any burrs or scratches are noticed on the flow control valve, replace the flow control valve. Do NOT attempt to clean the flow control valve.	-	Go to **Step 18**	-

	Replace the power steering pump. Refer to **Power Steering Pump Flow Control Valve Replacement - On Vehicle (L26)** or **Power Steering Pump Flow Control Valve Replacement - On Vehicle (LD8)**.		Go to **Step 18**	-
14	3. Inspect the flow control valve bore. If any burrs or scratches are present in the control valve bore, replace the power steering pump. Refer to **Power Steering Pump Replacement (LD8)** or **Power Steering Pump Replacement (L26)**. Did you complete the repair?	-	Go to **Step 18**	-
15	Replace the power steering pump flow control valve. Refer to **Power Steering Pump Flow Control Valve Replacement - On Vehicle (L26)** or **Power Steering Pump Flow Control Valve Replacement - On Vehicle (LD8)**. Did you complete the replacement?	-	Go to **Step 18**	-
16	1. Remove the power steering pump flow control valve and inspect for any wear or damage. Do NOT disassemble the flow control valve. 2. If the flow control valve is worn damaged, replace the flow control valve. Refer to **Power Steering Pump Flow Control Valve Replacement - On Vehicle (L26)** or **Power Steering Pump Flow Control Valve Replacement**	-		

15	Replace the steering pump flow control valve. Refer to **Power Steering Pump Flow Control Valve Replacement - On Vehicle (LD8)** Did you complete the repair?	-	Go to **Step 18**	-
	Flow Control Valve Replacement - On Vehicle (L26) or **Power Steering Pump Flow Control**		Go to **Step 18**	-
17	The power steering gear is leaking ... steering gear. Refer to **Steering Gear Replacement**. Did you complete the replacement?	-	Go to **Step 18**	-
18	Test the power steering system for the original condition. Does the original condition still exist?	-	Go to **Step 5**	Go to **Step 19**
19	1. Disconnect and remove the **J 44721** from the vehicle. See **Special Tools**. 2. Connect the vehicle power steering pipes/hoses. 3. Bleed the power steering system and add fluid as necessary. Refer to **Power Steering System Bleeding**. Did you complete the repair?	-	System OK	-

POWER STEERING FLUID LEAKS

Power Steering Fluid Leaks

Step	Action	Yes	No
1	Did you review the Power Steering System General Description and perform the necessary inspections?	Go to **Step 2**	Go to **Symptoms - Power Steering System**
2	Verify that power steering fluid leaks are present. Is the power steering system leaking?	Go to **Step 3**	System OK
3	Inspect the power steering system fittings. Are the fittings leaking?	Go to **Step 8**	Go to **Step 4**
4	Inspect the power steering hoses. Are the hoses leaking?	Go to **Step 9**	Go to **Step 5**

Step	Action	Yes	No
5	Inspect the power steering sensors. Are the sensors leaking?	Go to **Step 10**	Go to **Step 6**
1 6	Did you review the Power Steering System General Description and perform the necessary inspection? Inspect the power steering pump, shaft seal and reservoir for leaks. Is the power steering pump, shaft seal or reservoir leaking?	Go to **Step 2**	Go to **Symptoms - Power Steering System**
	Verify that power steering fluid leaks are present. Is the power steering system leaking?	Go to **Step 11** Go to **Step 3**	Go to **Step 7** System OK
2 7	Inspect the power steering gear for leaks. Is the power steering gear leaking?	Go to **Step 12**	Go to **Step 3**
3	Inspect the power steering system fittings. Are the fittings leaking?	Go to **Step 8**	Go to **Step 4**
8 4	Tighten the fittings. Refer to **Fastener Tightening Specifications**. Inspect the power steering hoses. Are the hoses leaking?	Go to **Step 13** Go to **Step 9**	Go to **Step 5**
9	Replace the power steering hoses. Refer to the appropriate procedure(s): • **Power Steering Pressure Pipe/Hose Replacement (RPO L26)** or **Power Steering Pressure Pipe/Hose Replacement (RPO LD8)** • **Power Steering Return Hose Replacement (RPO L26)** or **Power Steering Return Hose Replacement (RPO LD8)** Did you complete the repair?	Go to **Step 13**	-
10	Replace the power steering sensors. Did you complete the repair?	Go to **Step 13**	-
11	Replace the power steering pump, shaft seal or reservoir. Refer to the appropriate procedures: • **Power Steering Pump Replacement (LD8)** or **Power Steering Pump Replacement (L26)** • **Power Steering Pump Shaft Seal Replacement (CB)** • **Power Steering Fluid Reservoir Replacement - Off Vehicle (CB**		

	Replace the power steering hoses. Refer to the appropriate procedure(s):		
9	Did you complete the repair?	Go to **Step 13**	-
12	Replace the power steering gear. Refer to **Steering Gear Replacement**. Did you complete the repair?	Go to **Step 13**	-
	Operate the system in Power Steering	Go to **Step 13**	-
13 10	Replace the power steering sensors. Did you complete the repair?	Go to **Step 13**	Go to **Step 3**

RATTLE, CLUNK OR SHUDDER NOISE FROM THE POWER STEERING SYSTEM

Rattle, Clunk or Shudder Noise from the Power Steering System

Step	Action	Yes	No
1	Did you review the Power Steering System General Description and perform the necessary inspections?	Go to **Step 2**	Go to **Symptoms - Power Steering System**
2	Verify that a rattle, clunk or shudder noise is present. Is a rattle, clunk or shudder noise present?	Go to **Step 3**	System OK
3	Inspect the power steering hoses for proper routing and clearance. Is the routing or clearance of the power steering hoses incorrect?	Go to **Step 11**	Go to **Step 4**
4	Inspect the engine drive belt for cracking or excessive wear. Refer to **Drive Belt Excessive Wear Diagnosis** in Engine Mechanical. Is the drive belt cracked or excessively worn?	Go to **Step 12**	Go to **Step 5**
5	Inspect the power steering pump pulley for damage. Is the power steering pump pulley damaged?	Go to **Step 13**	Go to **Step 6**
6	Inspect the power steering pump and the power steering mounting bracket/brace for the proper installation. Refer to **Power Steering Pump Replacement (LD8)** or **Power Steering Pump**		

1	Did you perform the Power Steering Pump Replacement (L26) in the General Steering and Suspension incorrect?	Go to **Step 12**	Go to **toms - Power Steering Sy**
2	Inspect the power steering gear for the proper installation. Refer to **Steering Gear Replacement**. Is the power steering gear installation incorrect?	Go to **Step 3**	System OK
3	Inspect the power steering hoses for proper routing and clearance. Is the routing or clearance of the power steering hoses incorrect?	Go to **Step 15**	Go to **Step 8**
4	Inspect the rack and pinion gear rack bearing preload for the proper adjustment. Refer to **Steering Gear Rack Bearing Preload Adjustment - Excessive Wear Diagnosis** in Engine Mechanical. Is the rack and pinion gear rack bearing preload adjustment incorrect?	Go to **Step 11**	Go to **Step 4**
5	Inspect the engine drive belt. Refer to **Drive Belt Inspection - Vehicle Off** in Engine Mechanical. Is the drive belt cracked or excessively worn?	Go to **Step 16**	Go to **Step 9**
6	Inspect the suspension. Is the suspension worn?	Go to **Step 12**	Go to **Step 5**
7	Inspect the power steering pump pulley for damage. Is the power steering pump pulley damaged?	Go to **Step 17**	Go to **Step 10**
8	Inspect the intermediate shaft. Is the intermediate shaft worn?	Go to **Step 18**	Go to **Step 3**
9	Inspect the power steering gear for damage. Is the power steering gear damaged?	Go to **Step 13**	Go to **Step 6**
10	Inspect the power steering pump for damage. Is the power steering pump damaged?	Go to **Step 14**	Go to **Step 7**
11	Adjust or replace the hoses. Refer to the appropriate procedure(s): • **Power Steering Pressure Pipe/Hose Replacement (RPO L26)** or **Power Steering Pressure Pipe/Hose Replacement (RPO LD8)** • **Power Steering Return Hose Replacement (RPO L26)** or **Power Steering Return Hose Replacement (RPO LD8)** Did you complete the repair?	Go to **Step 19**	-
12	Replace the engine drive belt. Refer to **Drive Belt Replacement** in Engine Mechanical. Did you complete the repair?	Go to **Step 19**	-
13	Replace the power steering pump pulley. Refer to **Power Steering Pump Pulley Replacement (RPO L26)** or **Power**		

	Steering Pump Pulley Replacement (RPO LD8)	Go to **Step 16**	Go to **Step 9**
9	Inspect the suspension. Is the suspension worn?	Go to **Step 17**	Go to **Step 10**
10	Inspect the intermediate shaft. Is the intermediate shaft worn?	Go to **Step 18**	Go to **Step 3**
14	Adjust or replace the hoses. Refer to the appropriate procedure(s). Did you complete the repair?	Go to **Step 19**	-
15	Install the power steering gear correctly. Refer to **Steering Gear Replacement (RPO L26)** or **Power Steering Pressure Pipe/Hose Replacement (RPO LD8)**. Did you complete the repair?	Go to **Step 19**	-
11 16	Adjust the rack and pinion gear rack bearing preload. Refer to **Steering Gear Rack Bearing Preload Adjustment - Off Vehicle (Rack and Pinion)** or **Power Steering Return Hose Replacement (RPO LD8)**. Did you complete the repair?	Go to **Step 19**	-
17	Replace the suspension components. Refer to **Diagnostic Starting Point - Suspension General Diagnosis** in Suspension General Diagnosis. Did you complete the repair?	Go to **Step 19**	-
12	Replace the engine drive belt. Refer to **Drive Belt Replacement** in Engine Mechanical. Did you complete the repair?	Go to **Step 19**	-
18	Replace the intermediate shaft. Refer to **Intermediate Steering Shaft Replacement** in Steering Wheel and Column. Did you complete the repair?	Go to **Step 19**	-
19	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 3**

WHINE OR GROWL NOISE FROM THE POWER STEERING SYSTEM

Whine or Growl Noise from the Power Steering System

Step	Action	Yes	No
1	Did you review the Power Steering System Description and perform the necessary inspections?	Go to **Step 2**	Go to **Symptoms - Power Steering System**
2	Verify that a whine or growl noise is present.		

Step	Action	Value(s)	Yes	No
1	Inspect the power steering fluid for the following conditions and contamination: necessary inspections? • Milky fluid - water		Go to **Step 2**	Go to **Symptoms - Power Steering System**
3	• Brown Fluid - burnt • Debris in fluid - plastic or dirt Is the fluid free of contamination?		Go to **Step 5**	Go to **Step 4**
4	Flush the power steering system. Refer to **Power Steering System Bleeding**. Did you complete the procedure?		Go to **Step 11**	Go to **Step 5**
5	Using the **J 39570** Chassis Ear, inspect the power steering gear for a whine or growl noise. Is the noise present at the power steering gear?		Go to **Step 8**	Go to **Step 6**
6	Using the **J 39570** , inspect the power steering pump for a whine or growl noise. Is the noise present at the power steering pump?		Go to **Step 9**	Go to **Step 7**
7	Using the **J 39570** , inspect the power steering hoses for a whine or growl noise. Is the noise present at the power steering hoses?		Go to **Step 10**	Go to **Step 2**
8	Replace the power steering gear. Refer to **Steering Gear Replacement**. Did you complete the repair?		Go to **Step 11**	-
9	Replace the power steering pump. Refer to **Power Steering Pump Replacement (LD8)** or **Power Steering Pump Replacement (L26)**. Did you complete the repair?		Go to **Step 11**	-
10	Adjust the routing of the power steering hoses. Did you complete the repair?		Go to **Step 11**	-
11	Operate the system in order to verify the repair. Did you correct the condition?		System OK	Go to **Step 3**

STEERING EFFORT HARD OR TOO EASY IN ONE OR BOTH DIRECTIONS

Steering Effort Hard or Too Easy in One or Both Directions

Step	Action	Yes	No
1	Did you review the Power Steering System General Description and perform the necessary inspections?	Go to **Step 2**	Go to **Symptoms - Power Steering System**
2	Verify that the steering effort is hard or too easy in one or both directions. Does the system operate normally?	System OK	Go to **Step 3**
3	Perform the power steering test procedure. Refer to **Power Steering System Test**. Did you complete the procedure?	Go to **Step 4**	-
4	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 3**

REPAIR INSTRUCTIONS

POWER STEERING SYSTEM BLEEDING

IMPORTANT:

- **Use clean, new power steering fluid type only. See the Maintenance and Lubrication article for fluid specifications. Refer to Fluid and Lubricant Recommendations .**
- **Hoses touching the frame, body or engine may cause system noise. Verify that the hoses do not touch any other part of the vehicle.**
- **Loose connections may not leak, but could allow air into the steering system. Verify that all hose connections are tight.**

IMPORTANT: Power steering fluid level must be maintained throughout bleed procedure.

1. Fill pump reservoir with fluid to minimum system level, FULL COLD level or middle of hash mark on cap stick fluid level indicator.

IMPORTANT: With hydro-boost only, the oil level will appear falsely high

if the hydro-boost accumulator is not fully charged. Do not apply the brake pedal with the engine OFF. This will discharge the hydro-boost accumulator.

2. If equipped with hydro-boost, fully charge the hydro-boost accumulator using the following procedure:
    1. Start the engine.
    2. Firmly apply the brake pedal 10-15 times.
    3. Turn the engine OFF.
3. Raise the vehicle until the front wheels are off the ground. Refer to **Lifting and Jacking the Vehicle** .
4. Key on engine OFF, turn the steering wheel from stop to stop 12 times.

    Vehicles equipped with hydro-boost systems or longer length power steering hoses may require turns up to 15 to 20 stop to stops.

5. Verify power steering fluid level per operating specification. Refer to **Checking and Adding Power Steering Fluid**.
6. Start the engine. Rotate steering wheel from left to right. Check for sign of cavitation or fluid aeration (pump noise/whining).
7. Verify the fluid level. Repeat the bleed procedure, if necessary.

CHECKING AND ADDING POWER STEERING FLUID

NOTE: When adding fluid or making a complete fluid change, always use the proper power steering fluid. Failure to use the proper fluid will cause hose and seal damage and fluid leaks.

1. Clean the area surrounding the reservoir cap.
2. Remove the reservoir cap.
3. Inspect the power steering pump fluid level at regular intervals. Use the appropriate procedure below.

    Add fluid when required. Refer to **Fluid and Lubricant Recommendations** .

    Fluid Is Hot

    1. Run the engine until the fluid reaches about 80°C (170°F).
    2. Turn the engine OFF.
    3. Remove the reservoir cap.
    4. Inspect the fluid level on the capstick.

5. Ensure that the fluid level is at the HOT/FULL mark on the capstick.
4. If the fluid level is low, add power steering fluid to the proper level.
5. Install the reservoir cap.
6. When checking the fluid level after servicing the steering system, bleed the air from the system. Refer to **Power Steering System Bleeding**.

POWER STEERING SYSTEM FLUSHING

IMPORTANT: Do not reuse any drained power steering fluid regardless of appearance or condition.

1. Turn OFF the engine.
2. Raise the front end of the vehicle off the ground until the tires and wheels turn freely. Refer to **Lifting and Jacking the Vehicle** .
3. Place a large container under the fluid return hose in order to collect the draining fluid.
4. Remove the fluid return hose at the power steering pump reservoir inlet connection.
5. Plug the reservoir return hose inlet connection on the power steering pump.

IMPORTANT: This step may require 4 L (4 qt) of power steering fluid until the draining fluid appears clear.

6. With the key on engine off, turn the steering wheel fully to the left and to the right while an assistant maintains the minimum fluid level in the reservoir using new approved power steering fluid. Continue until the fluid from the return hose runs clear.
7. Remove the plug from the pump reservoir inlet connection and install the fluid return hose to the pump reservoir.

IMPORTANT: Do NOT run the engine without the power steering fluid at a minimum system level.

8. Bleed the power steering system. Refer to **Power Steering System Bleeding**.
9. Inspect the power steering fluid for the following indications of contamination:
   - Milky fluid - water
   - Brown fluid - burnt
   - Plastic debris or dirt chunks
10. If the fluid is contaminated, repeat steps 2-9.
11. Lower the vehicle and check the Power Steering system for leaks.

POWER STEERING PUMP FLOW CONTROL VALVE REPLACEMENT - ON VEHICLE (L26) (L26)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Install a drain pan under the vehicle.

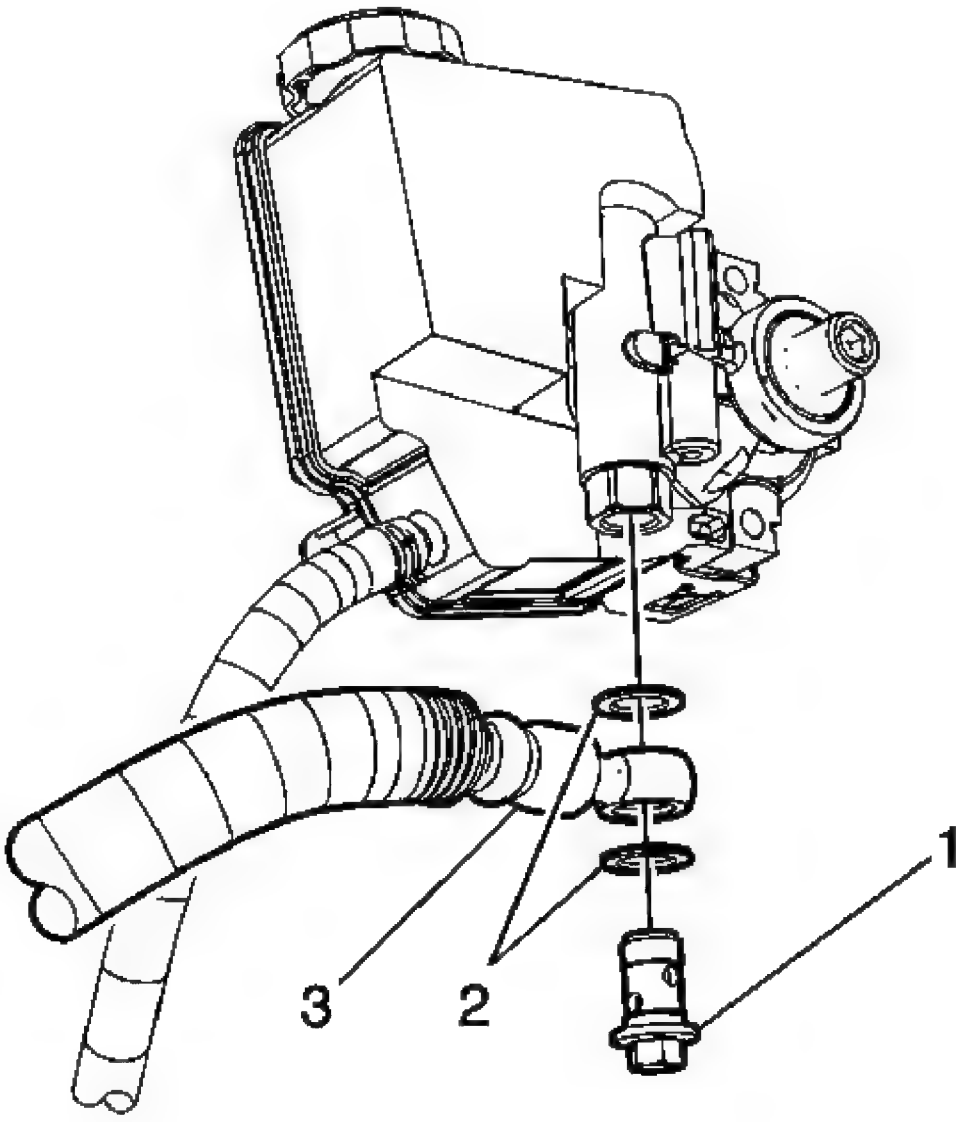


Fig. 4: Identifying Steering Pump Flow Control Valve
Courtesy of GENERAL MOTORS CORP.

3. Remove the power steering pressure hose banjo bolt (1).
4. Remove the 2 washers (2) and position the hose (3) aside

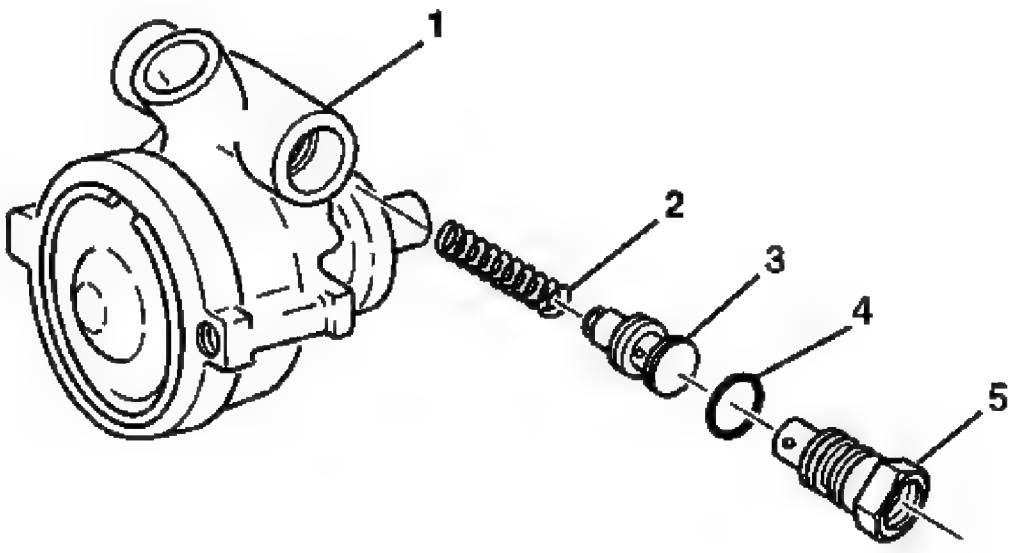


Fig. 5: Exploded View Of Power Steering Pump Flow Control Valve (CB Series)
Courtesy of GENERAL MOTORS CORP.

5. Remove the flow control valve assembly (3) from the power steering pump.
6. Remove the power steering flow control spring (2).

Installation Procedure

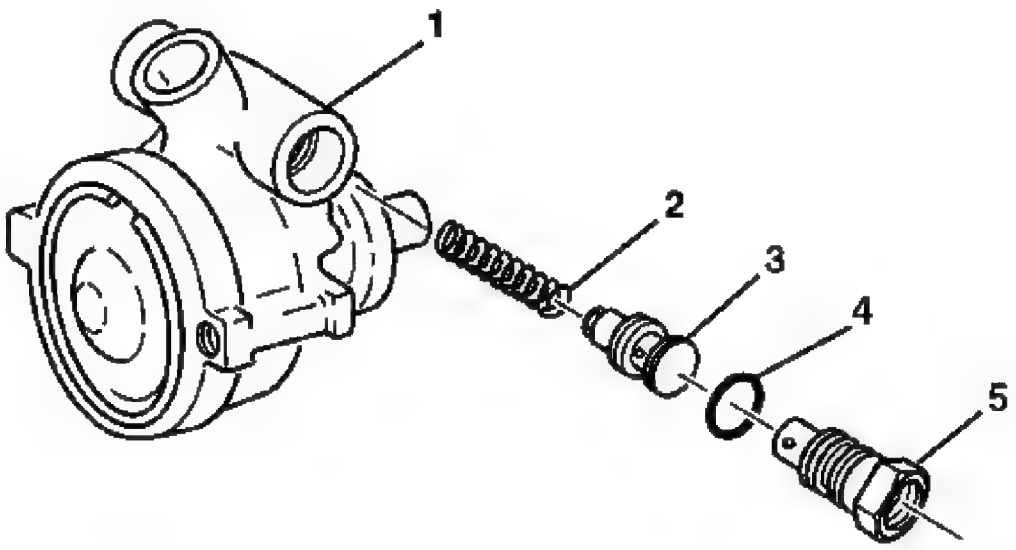


Fig. 6: Exploded View Of Power Steering Pump Flow Control Valve (CB Series)
Courtesy of GENERAL MOTORS CORP.

1. Install the power steering flow control spring (2) to the power steering pump.

   NOTE: **Refer to Fastener Notice .**

2. Install the power steering flow control valve assembly (3) to the power steering pump.

   Tighten: Tighten the power steering flow control valve assembly (5) to 75 N.m (55 lb ft).

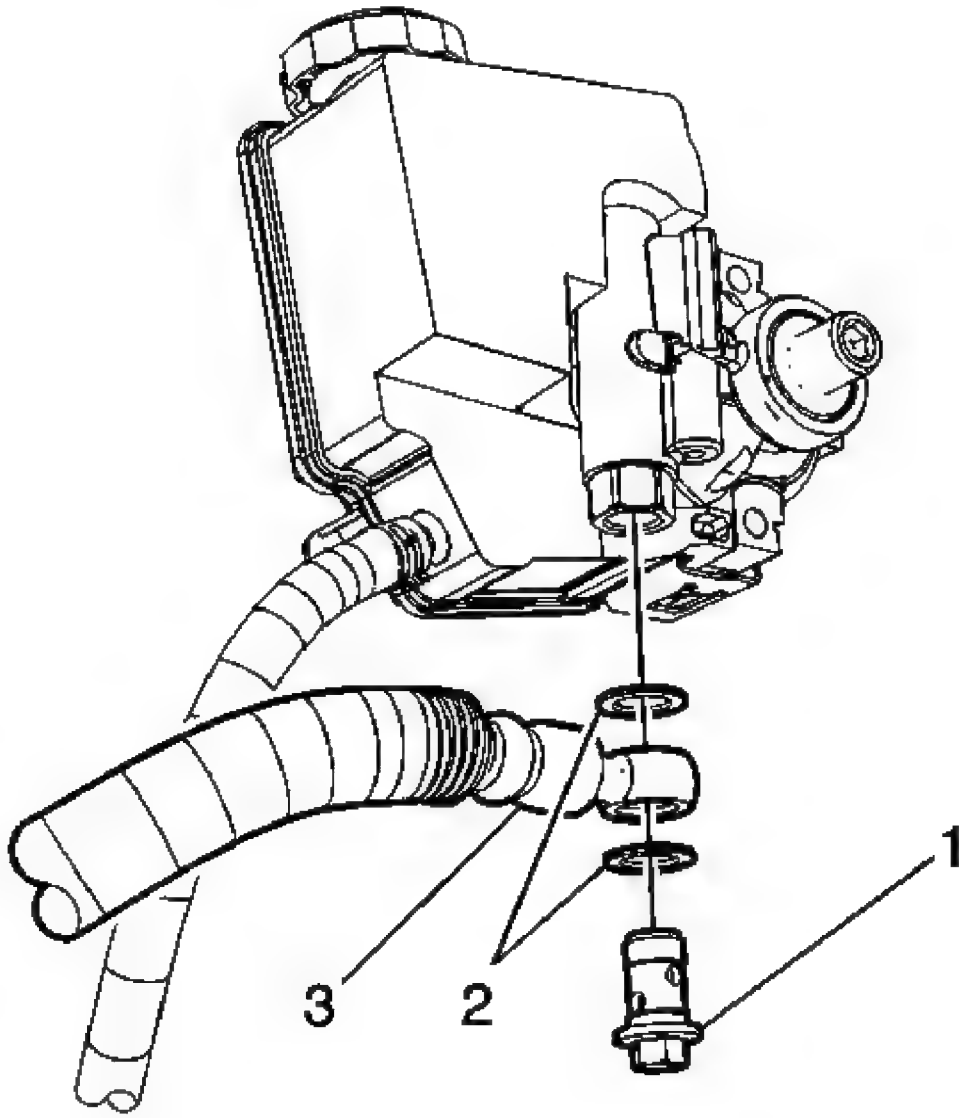


Fig. 7: Identifying Steering Pump Flow Control Valve
Courtesy of GENERAL MOTORS CORP.

3. Position the power steering pressure hose (3) to the power steering pump, with the 2 NEW washers (2) and install the banjo bolt (1).

   Tighten: Tighten the power steering pressure hose banjo bolt to 55 N.m (41 lb ft).

4. Lower the vehicle.
5. Bleed the power steering system. Refer to **Power Steering System Bleeding**.

POWER STEERING PUMP FLOW CONTROL VALVE REPLACEMENT - ON VEHICLE (LD8) (LD8)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Install a drain pan under the vehicle.

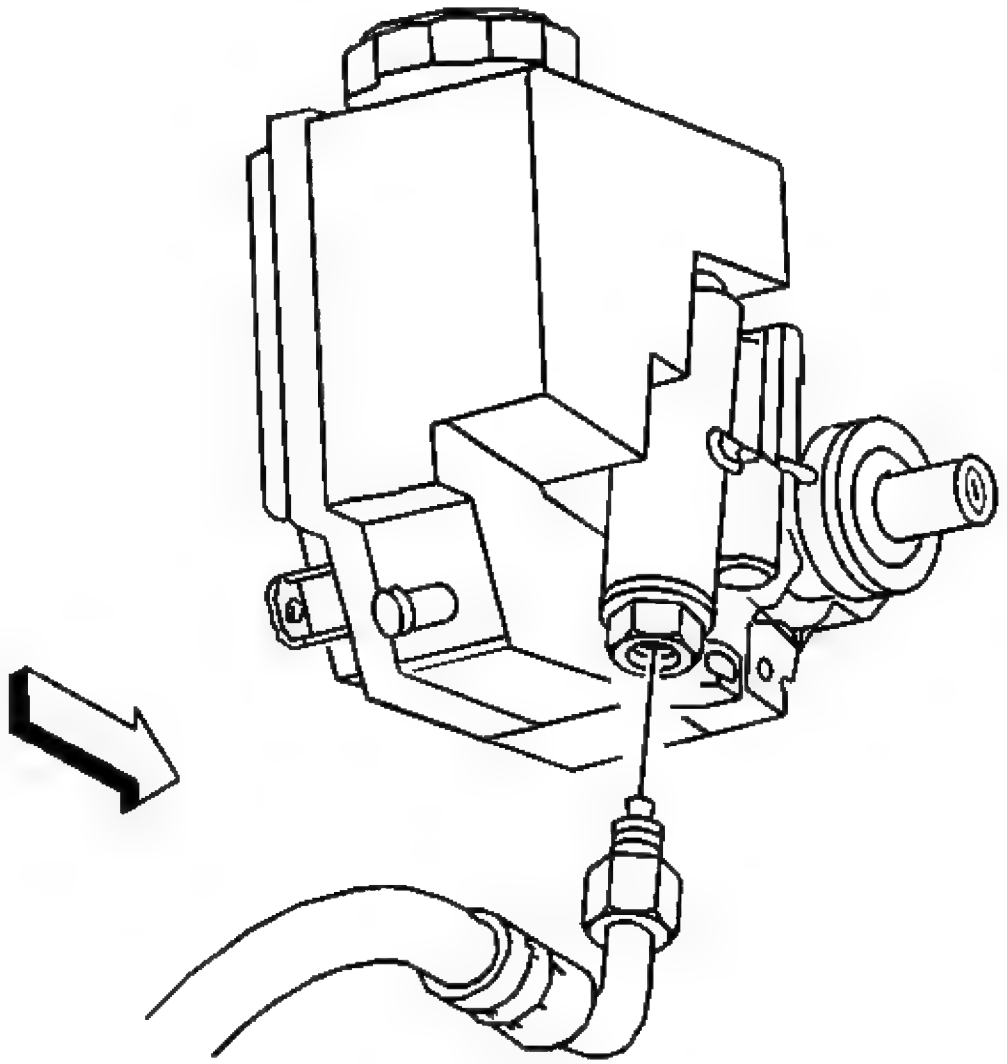


Fig. 8: Removing/Installing Power Steering Hose Fitting
Courtesy of GENERAL MOTORS CORP.

3. Remove the power steering pressure hose from the flow control valve.

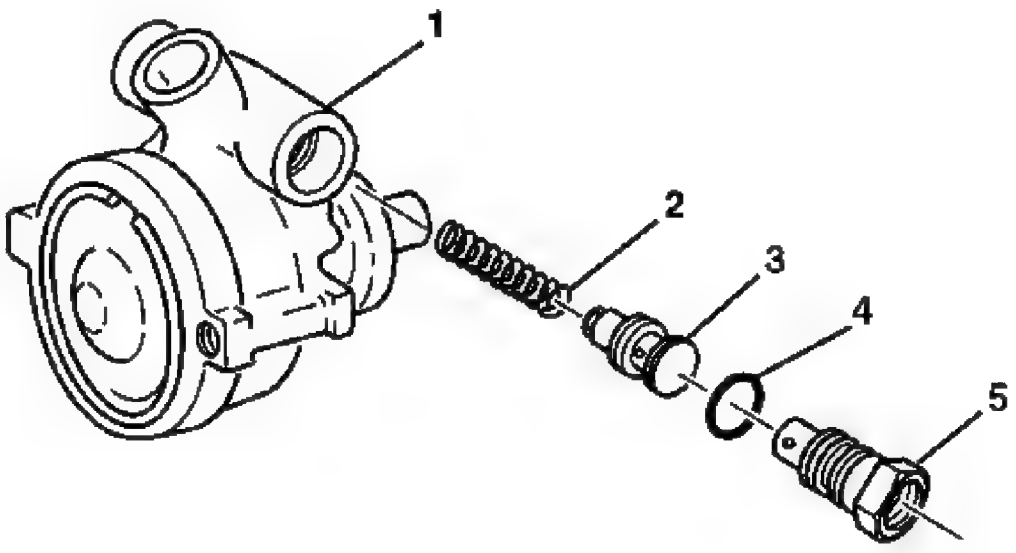


Fig. 9: Exploded View Of Power Steering Pump Flow Control Valve (CB Series)
Courtesy of GENERAL MOTORS CORP.

4. Remove the flow control valve assembly (3) from the power steering pump.
5. Remove the power steering flow control spring (2).

Installation Procedure

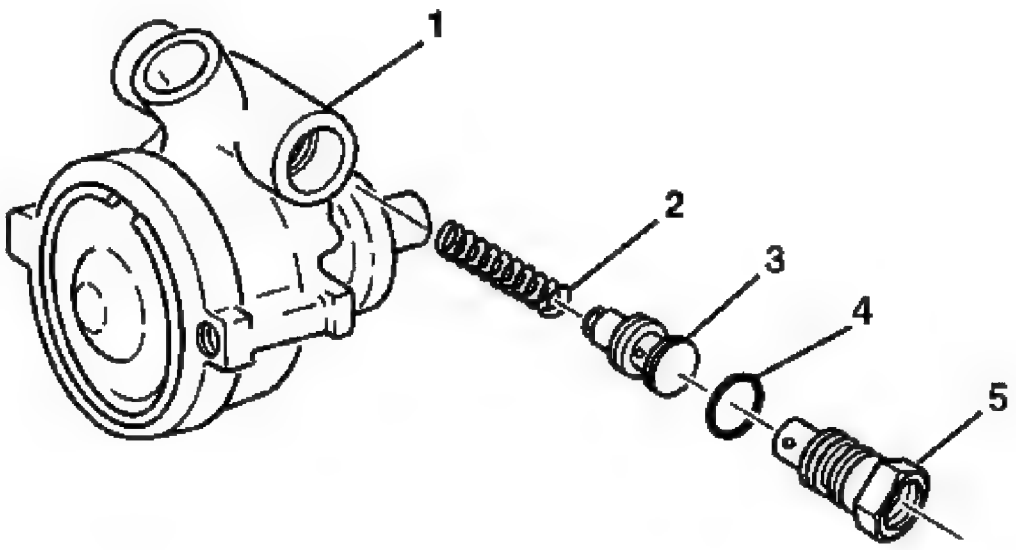


Fig. 10: Exploded View Of Power Steering Pump Flow Control Valve (CB Series)
Courtesy of GENERAL MOTORS CORP.

1. Install the power steering flow control spring (2) to the power steering pump.

   NOTE: **Refer to FASTENER NOTICE .**

2. Install the power steering flow control valve assembly (3) to the power steering pump.

   Tighten: Tighten the power steering flow control valve assembly (5) to 75 N.m (55 lb ft).

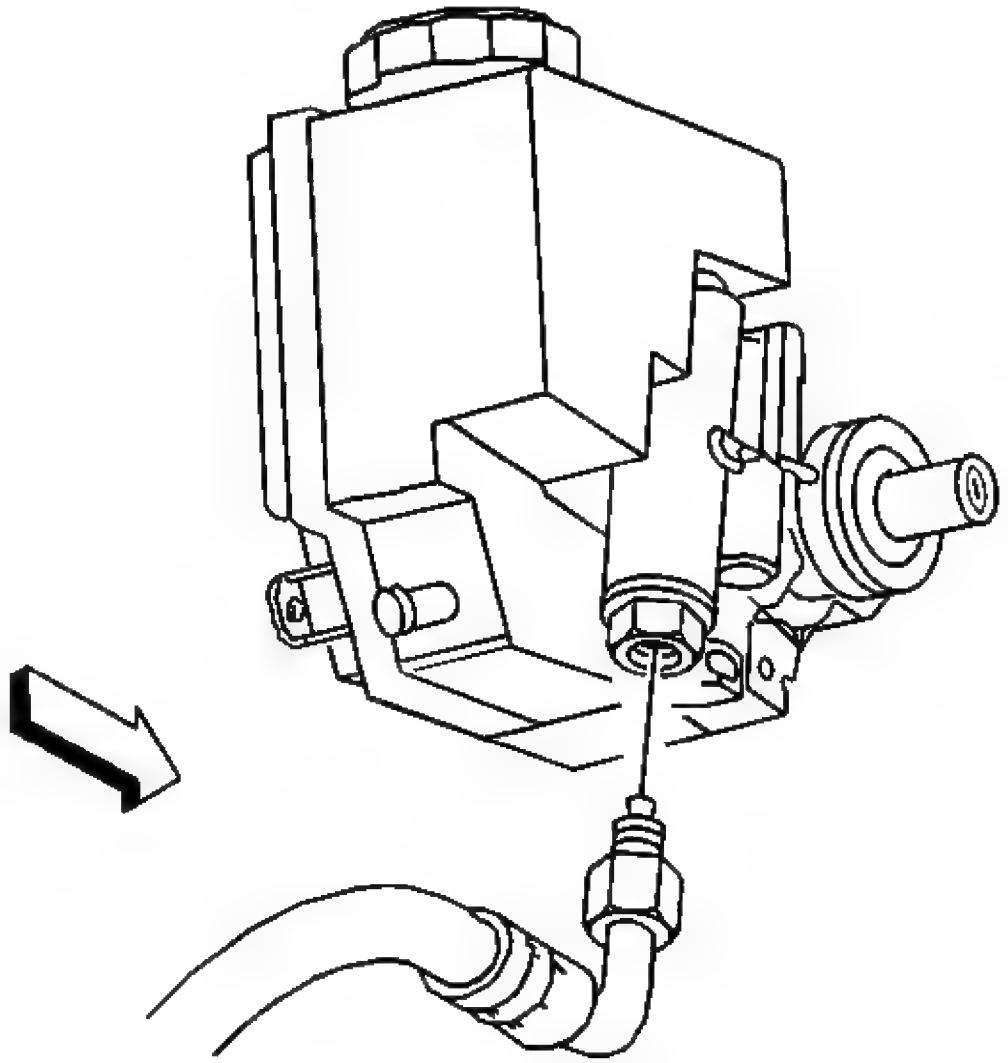


Fig. 11: Removing/Installing Power Steering Hose Fitting
Courtesy of GENERAL MOTORS CORP.

3. Install the power steering pressure hose to the power steering pump.

   Tighten: Tighten the power steering pressure hose to 30 N.m (22 lb ft).

4. Lower the vehicle.
5. Bleed the power steering system. Refer to **Power Steering System Bleeding**.

POWER STEERING PUMP PULLEY REPLACEMENT (RPO L26)

Tools Required

- **J 25034-C** Pulley Remover. See **Special Tools**.
- **J 25033-C** Pulley Installer. See **Special Tools**.

Removal Procedure

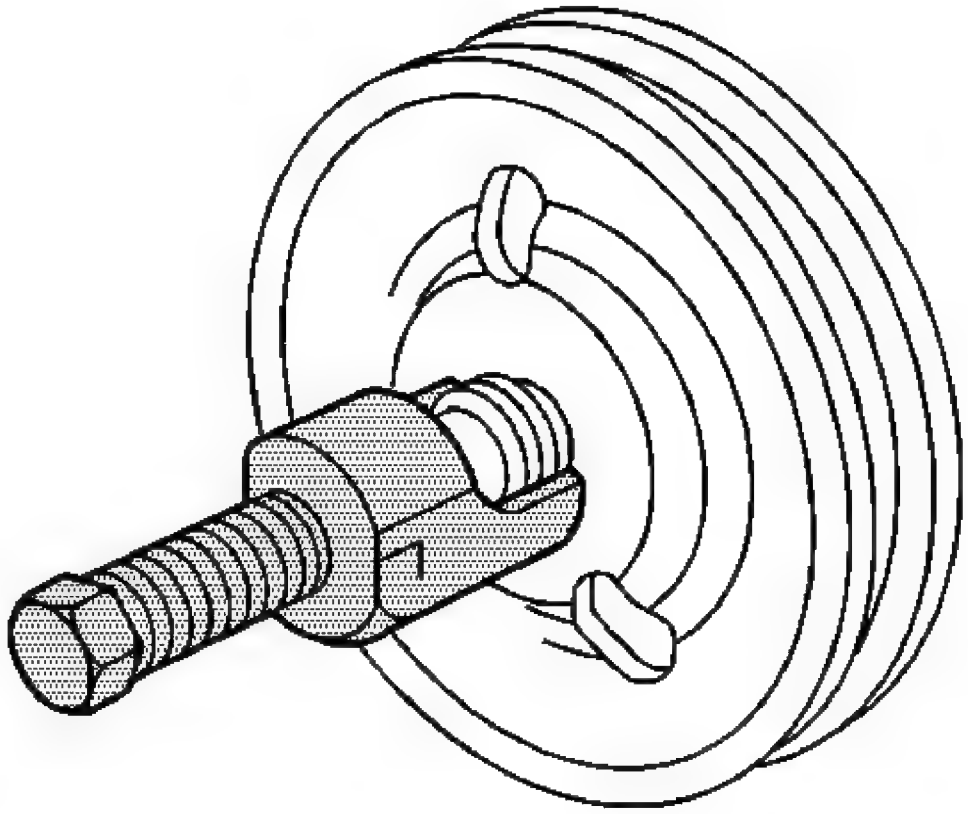


Fig. 12: View Of Power Steering Pump Pulley Remover
Courtesy of GENERAL MOTORS CORP.

1. Remove the drive belt. Refer to **Drive Belt Replacement** .
2. Remove the power steering pump. Refer to **Power Steering Pump Replacement (LD8)** or **Power Steering Pump Replacement (L26)**.
3. Use the **J 25034-C** to remove the power steering pulley from the power steering pump. See **Special Tools**.

Installation Procedure

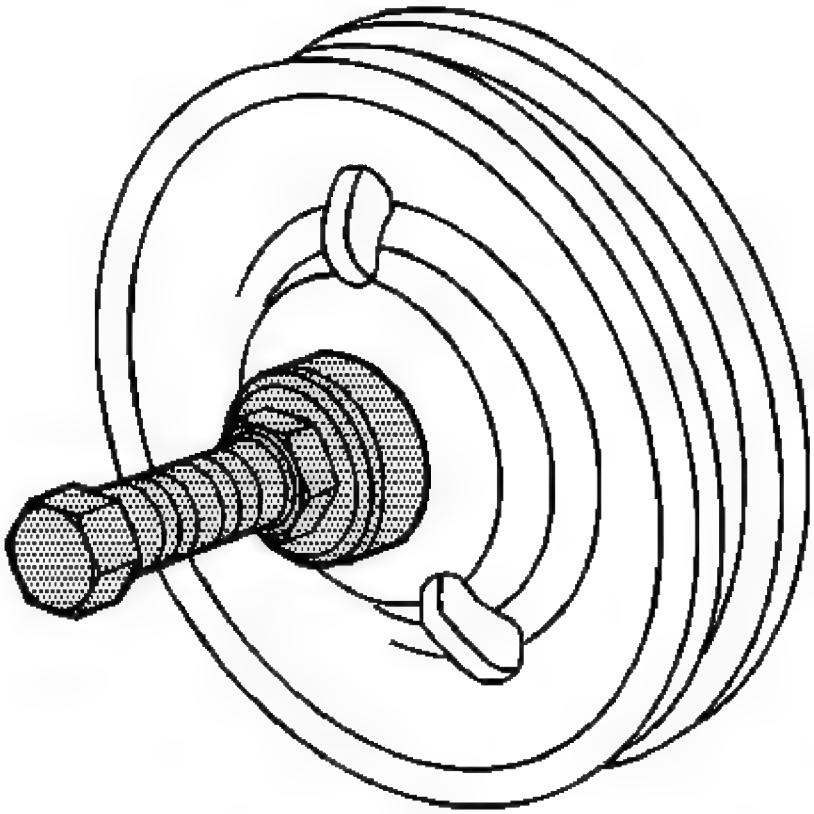


Fig. 13: View Of Power Steering Pump Pulley Installer
Courtesy of GENERAL MOTORS CORP.

1. Use the **J 25033-C** to install the power steering pulley to the power steering pump. See **Special Tools**.

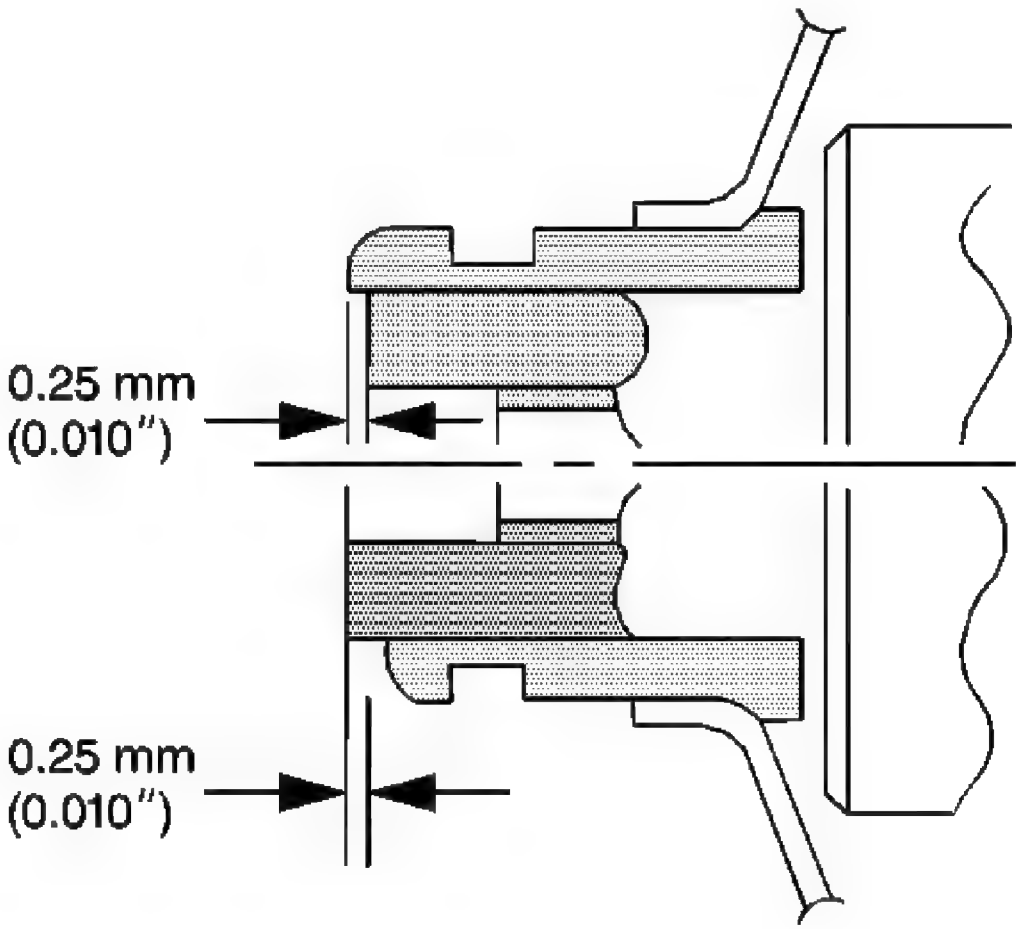


Fig. 14: Measuring Axial Tolerance Of Power Steering Pulley On Pump
Courtesy of GENERAL MOTORS CORP.

2. Ensure that the axial tolerance of the power steering pulley on the power steering pump is within 0.25 mm (0.010 in).
3. Install the power steering pump to the engine. Refer to **Power Steering Pump Replacement (LD8)** or **Power Steering Pump Replacement (L26)**.
4. Install the pump drive belt. Refer to **Drive Belt Replacement** .
5. Bleed the power steering system. Refer to **Power Steering System Bleeding**.
6. Inspect the system for leaks.

POWER STEERING PUMP PULLEY REPLACEMENT (RPO LD8)

Tools Required

- **J 25034-C** Pulley Remover. See **Special Tools**.
- **J 25033-C** Pulley Installer. See **Special Tools**.

Removal Procedure

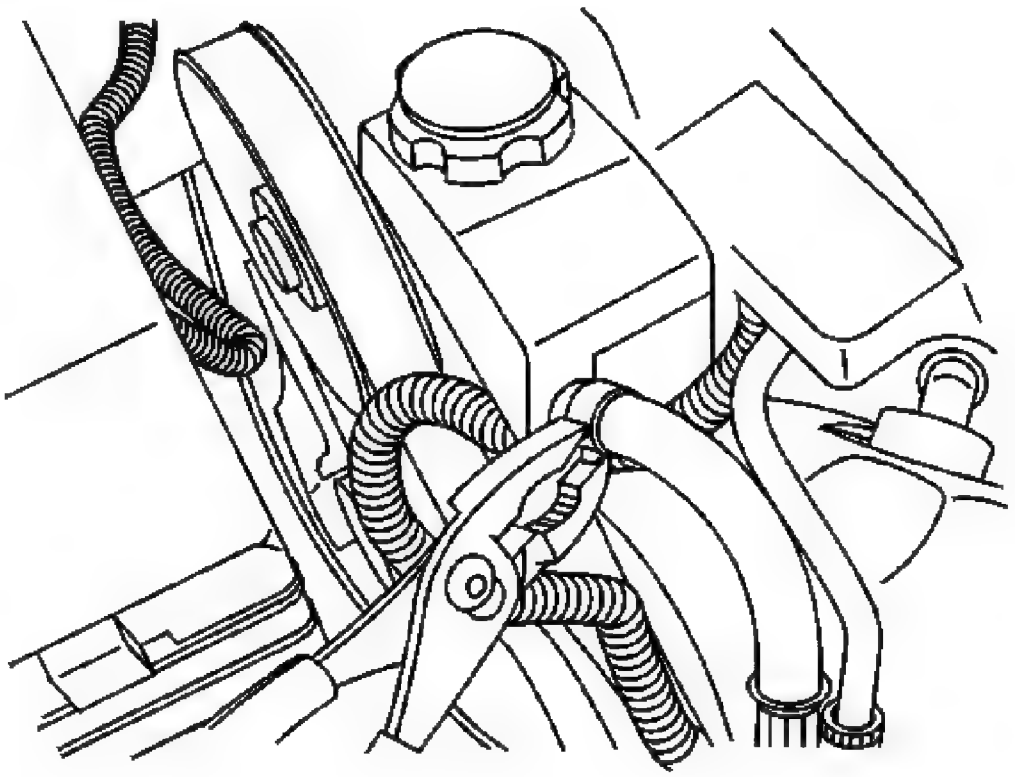


Fig. 15: Identifying Power Steering Return Hose
Courtesy of GENERAL MOTORS CORP.

1. Remove the drive belt. Refer to **Drive Belt Replacement** .
2. Install a drain pan under the vehicle.
3. Disconnect the power steering return hose from the power steering reservoir.
4. Remove the power steering pump mounting bolt.

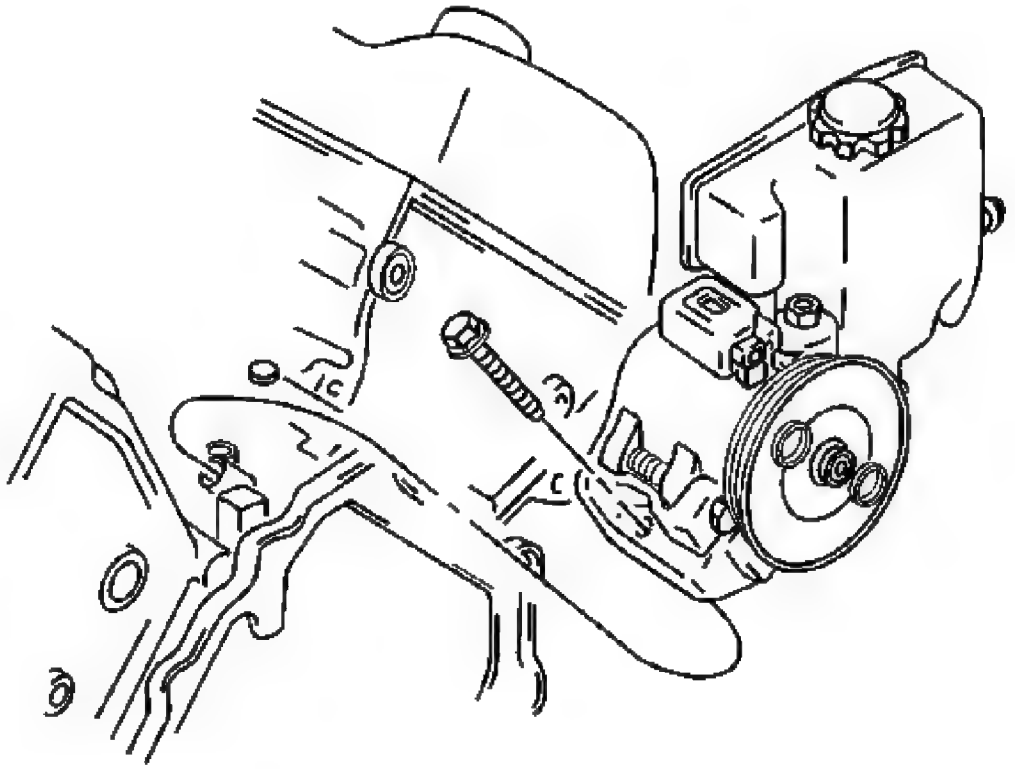


Fig. 16: View of Power Steering Pump
Courtesy of GENERAL MOTORS CORP.

5. Raise the power steering pump up to access the power steering pulley.
6. Use the **J 25034-C** to remove the power steering pulley. See **Special Tools**.

Installation Procedure

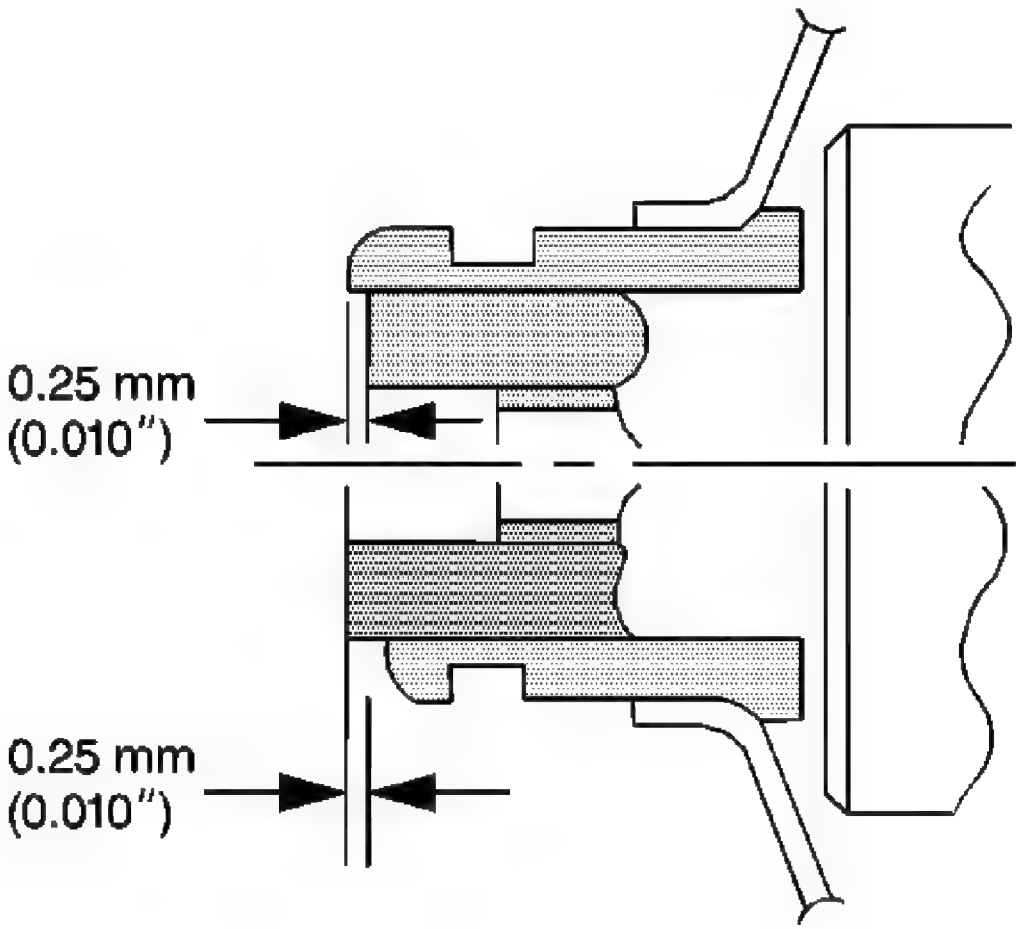


Fig. 17: Measuring Axial Tolerance Of Power Steering Pulley On Pump
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Ensure the pulley is installed flush to within 0.25 mm (0.010 in) of the shaft.

1. Use the **J 25033-C** to install the power steering pulley to the pump. See **Special Tools**.

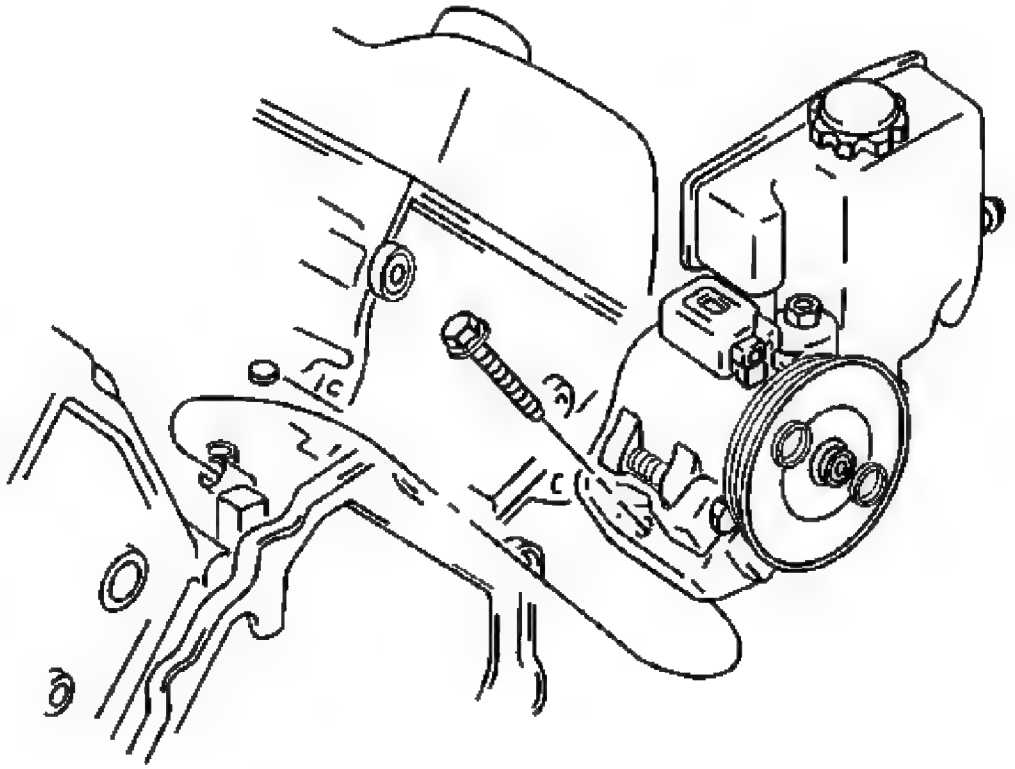


Fig. 18: View of Power Steering Pump
Courtesy of GENERAL MOTORS CORP.

2. Position the power steering pump to the engine.

NOTE: **Refer to Fastener Notice .**

3. Install the power steering pump mounting bolt.

Tighten: Tighten the power steering pump mounting bolt to 50 N.m (37 lb ft).

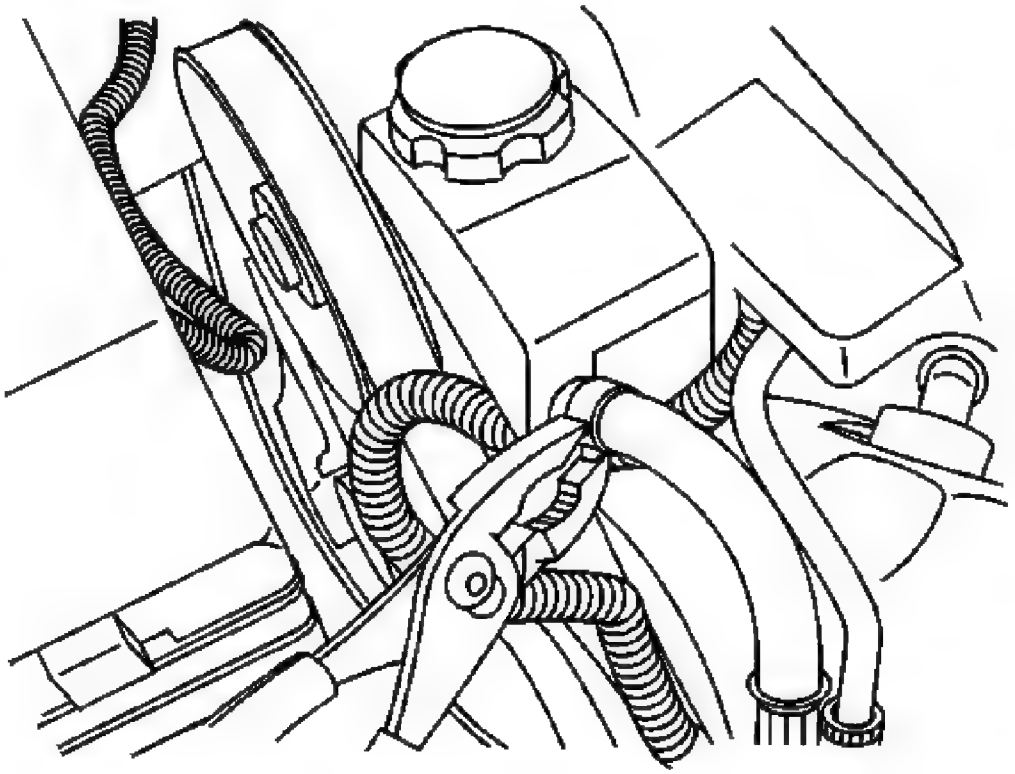


Fig. 19: Identifying Power Steering Return Hose
Courtesy of GENERAL MOTORS CORP.

4. Install the power steering return hose to the power steering reservoir.
5. Remove the drain pan from under vehicle.
6. Install the drive belt. Refer to **Drive Belt Replacement** .
7. Bleed the power steering system. Refer to **Power Steering System Bleeding**.

POWER STEERING PUMP REPLACEMENT (LD8)

Removal Procedure

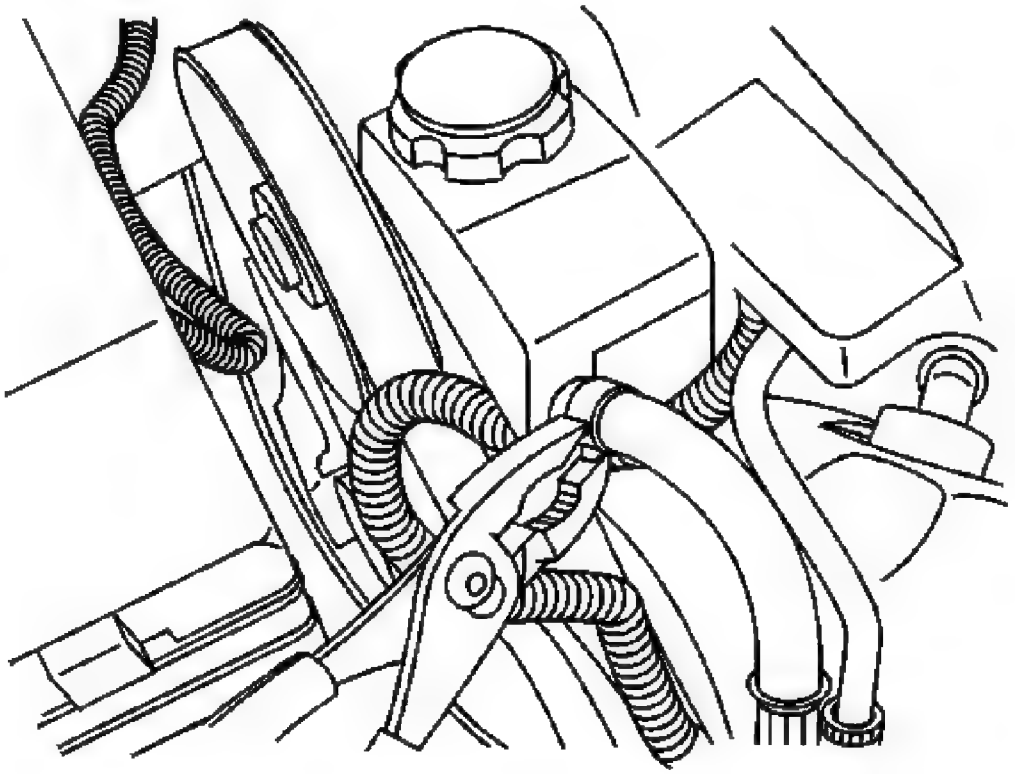


Fig. 20: Identifying Power Steering Return Hose
Courtesy of GENERAL MOTORS CORP.

1. Remove the drive belt. Refer to **Drive Belt Replacement** .
2. Install a drain pan under the vehicle.
3. Disconnect the power steering return hose from the power steering reservoir.

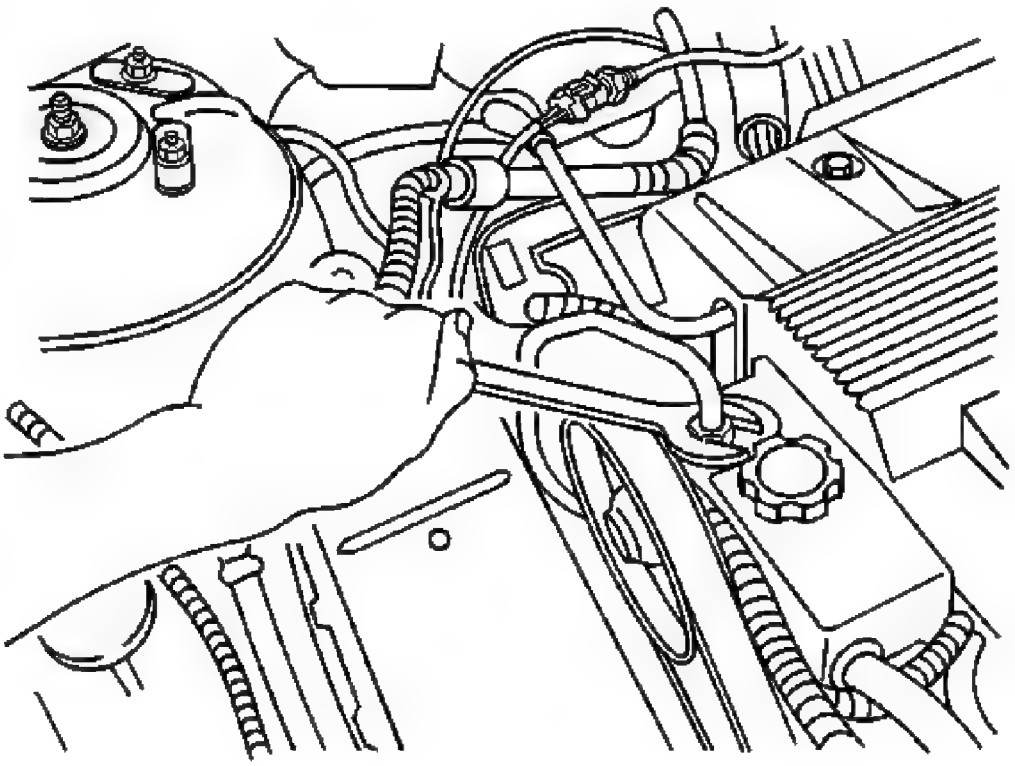


Fig. 21: View Of Power Steering Pressure Hose & Power Steering Pump
Courtesy of GENERAL MOTORS CORP.

4. Remove the power steering pressure hose from the power steering pump.

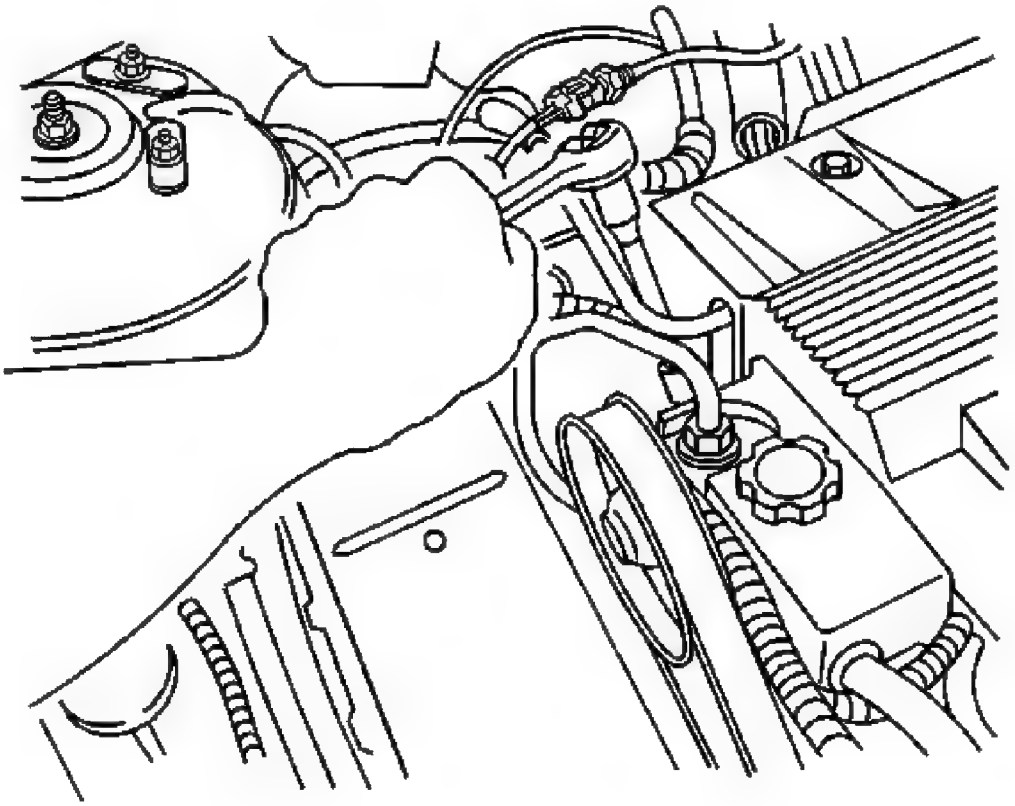


Fig. 22: Identifying Power Steering Pump Mounting Bolt
Courtesy of GENERAL MOTORS CORP.

5. Remove the power steering pump mounting bolt.

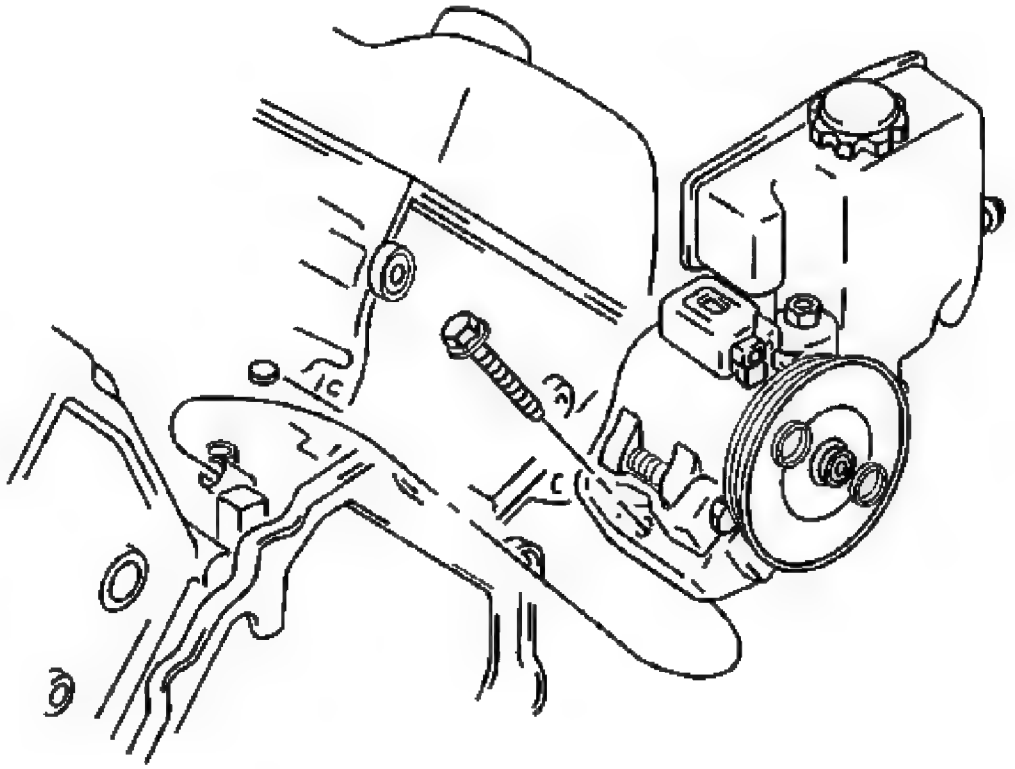


Fig. 23: View of Power Steering Pump
Courtesy of GENERAL MOTORS CORP.

6. Remove the power steering pump from the vehicle.
7. Remove the power steering pulley. Refer to **Power Steering Pump Pulley Replacement (RPO L26)** or **Power Steering Pump Pulley Replacement (RPO LD8)**.
8. Remove the power steering reservoir. Refer to **Power Steering Fluid Reservoir Replacement - Off Vehicle (CB Series)**.

Installation Procedure

1. Install the power steering reservoir. Refer to **Power Steering Fluid Reservoir Replacement - Off Vehicle (CB Series)**.
2. Install the power steering pulley. Refer to **Power Steering Pump Pulley Replacement (RPO L26)** or **Power Steering Pump Pulley Replacement (RPO LD8)**.

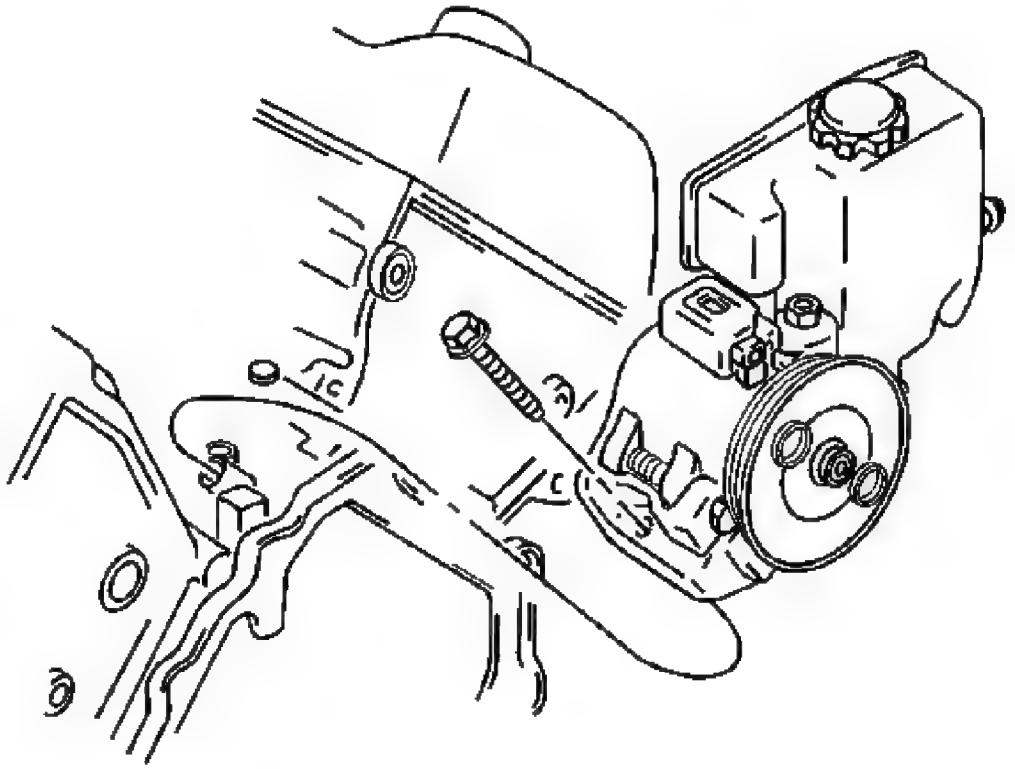


Fig. 24: View of Power Steering Pump
Courtesy of GENERAL MOTORS CORP.

3. Install the power steering pump to the vehicle.

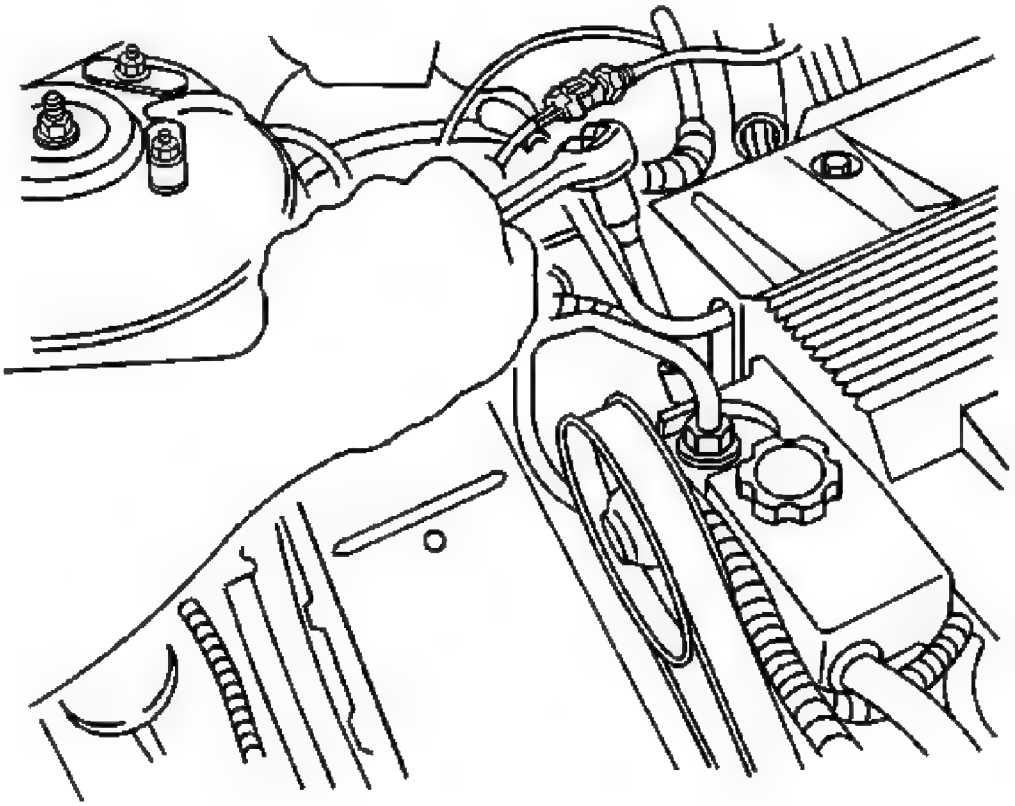


Fig. 25: Identifying Power Steering Pump Mounting Bolt
Courtesy of GENERAL MOTORS CORP.

NOTE: **Refer to Fastener Notice .**

4. Install the power steering pump mounting bolt.

Tighten: Tighten the power steering pump mounting bolt to 50 N.m (37 lb ft).

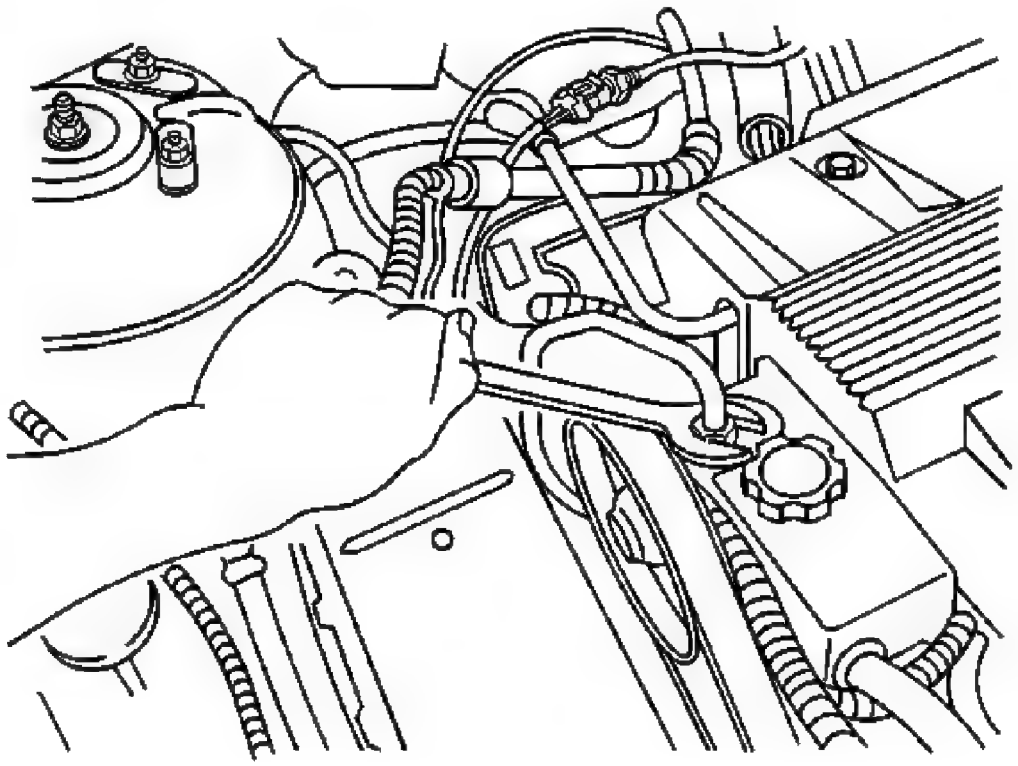


Fig. 26: View Of Power Steering Pressure Hose & Power Steering Pump
Courtesy of GENERAL MOTORS CORP.

5. Install the power steering pressure hose to the power steering pump.

   Tighten: Tighten the power steering pressure hose to 27 N.m (20 lb ft).

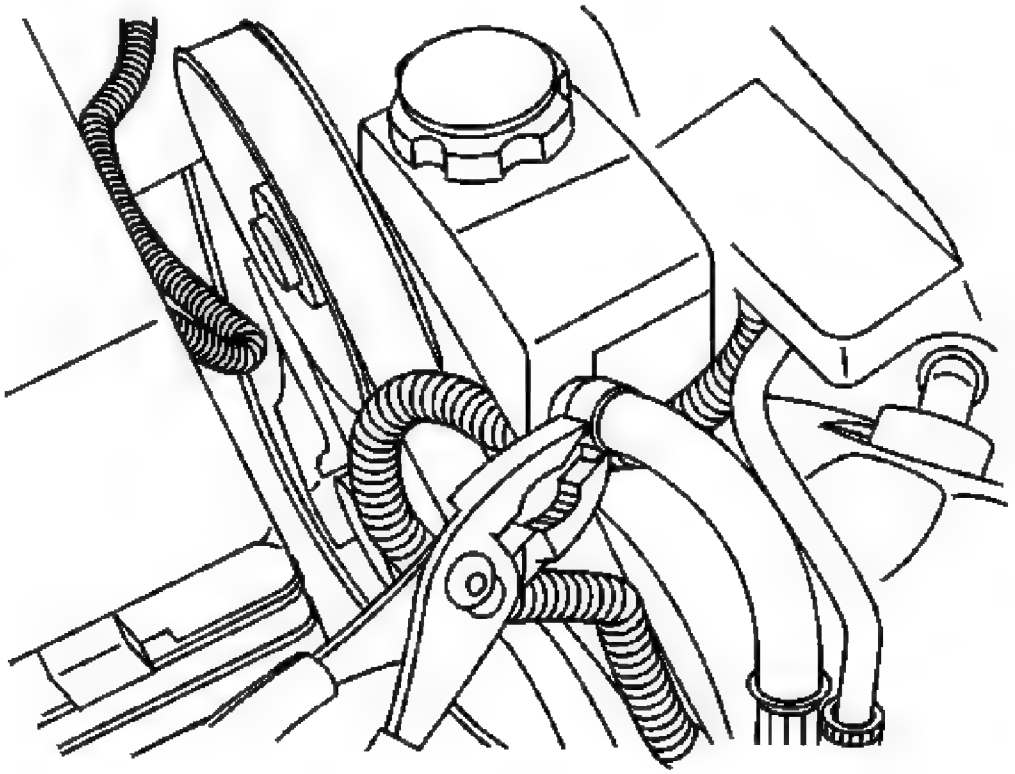


Fig. 27: Identifying Power Steering Return Hose
Courtesy of GENERAL MOTORS CORP.

6. Install the power steering return hose to the power steering reservoir.
7. Remove the drain pan from under vehicle.
8. Install the drive belt. Refer to **Drive Belt Replacement** .
9. Bleed the power steering system. Refer to **Power Steering System Bleeding**.

POWER STEERING PUMP REPLACEMENT (L26)

Removal Procedure

1. Remove the drive belt. Refer to **Drive Belt Replacement** .
2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
3. Install a drain pan under the vehicle.

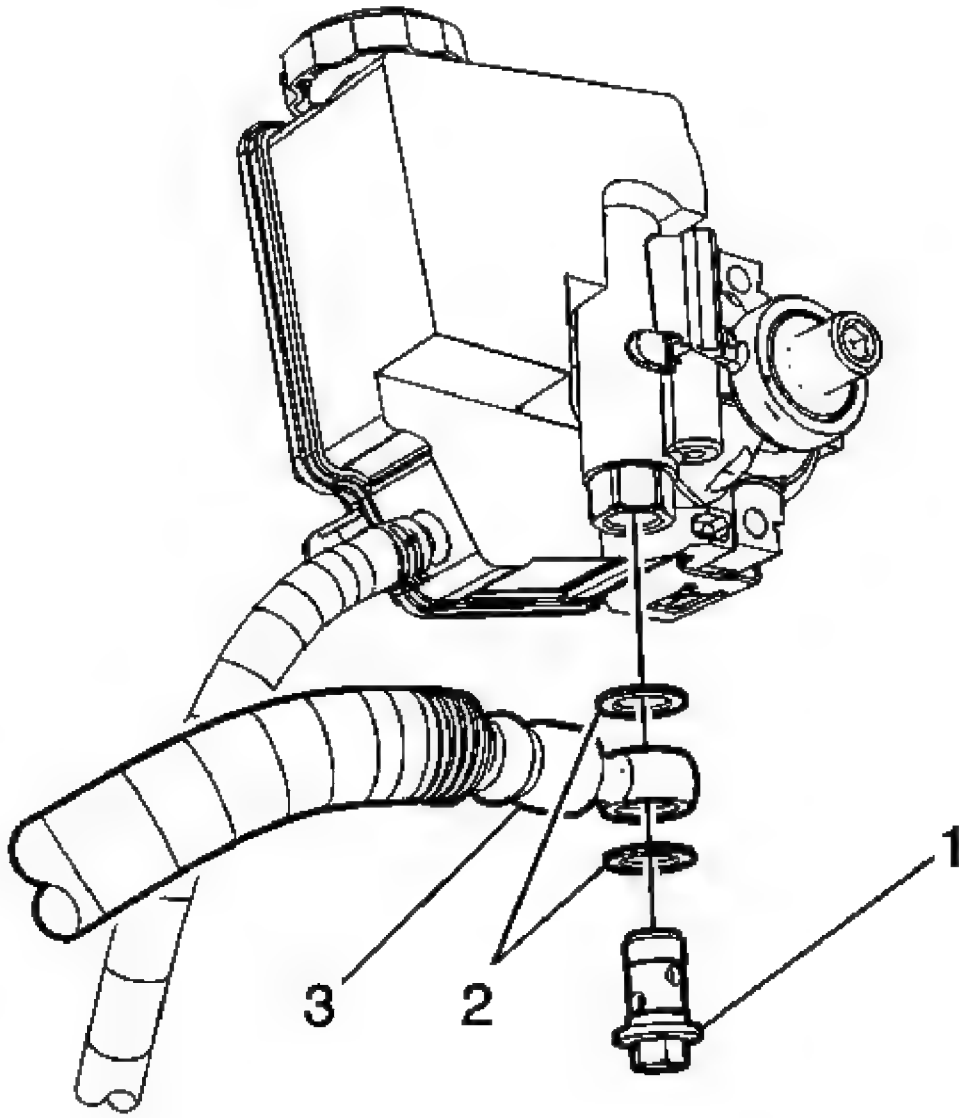


Fig. 28: Identifying Steering Pump Flow Control Valve
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the power steering pressure hose banjo bolt (1), remove the 2 washers (2) and position the hose (3) aside.

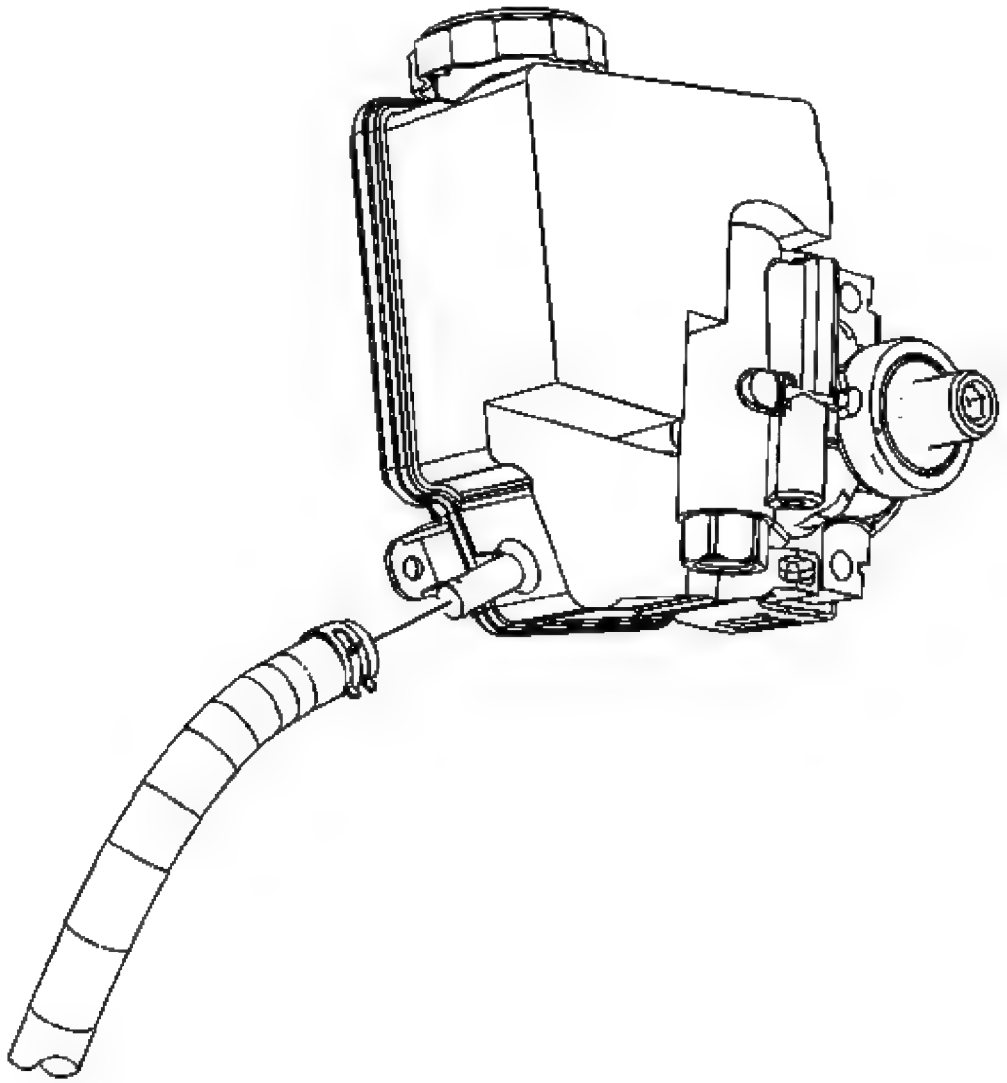


Fig. 29: Identifying Power Steering Return Hose
Courtesy of GENERAL MOTORS CORP.

5. Compress the clamp and disconnect the power steering return hose from the power steering pump.
6. Disconnect the wiring harness from the power steering pump.
7. Lower the vehicle.
8. Remove the coolant recovery reservoir. Refer to **Coolant Recovery Reservoir Replacement** .

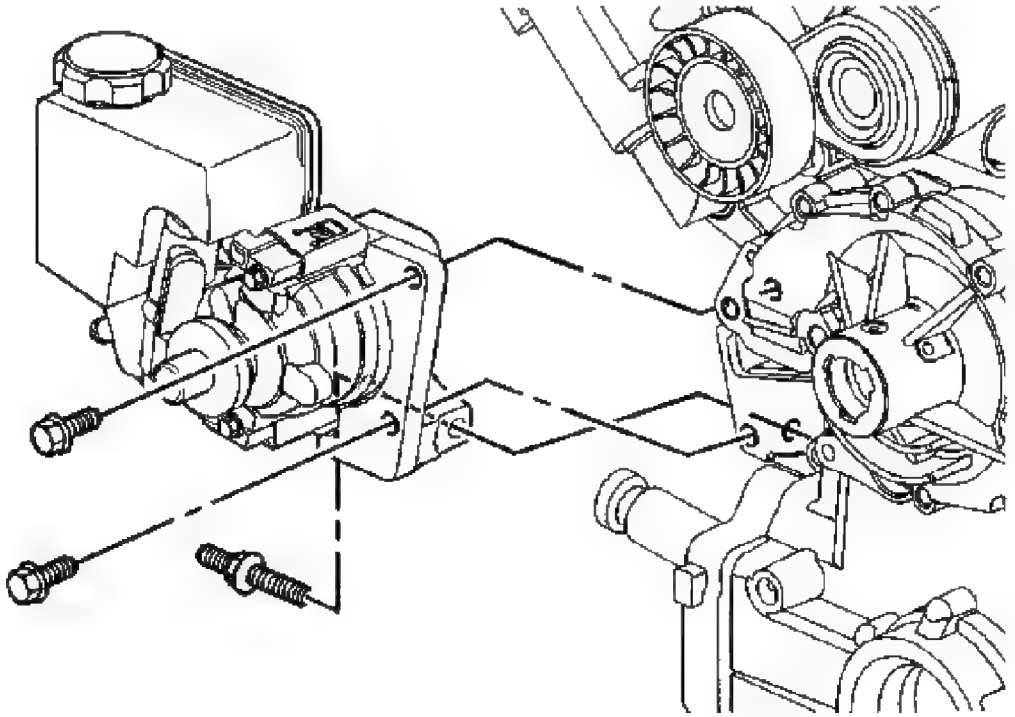


Fig. 30: Removing/Installing Power Steering Pump Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

9. Remove the power steering pump retaining bolts.
10. Remove the power steering pump.
11. Transfer the power steering pulley as needed. Refer to **Power Steering Pump Pulley Replacement (RPO L26)** or **Power Steering Pump Pulley Replacement (RPO LD8)**.

Installation Procedure

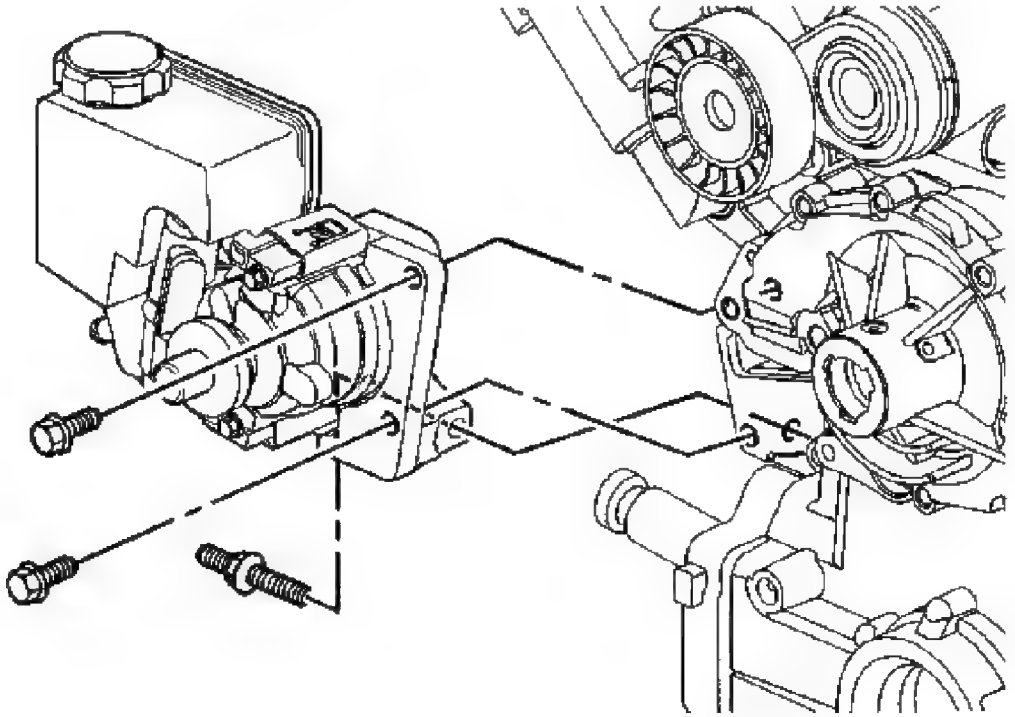


Fig. 31: Removing/Installing Power Steering Pump Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the power steering pump to the engine.

   NOTE: **Refer to Fastener Notice .**

2. Install the power steering pump retaining bolts.

   Tighten: Tighten the power steering pump retaining bolts to 25 N.m (18 lb ft).

3. Install the coolant recovery reservoir. Refer to **Coolant Recovery Reservoir Replacement** .
4. Raise the vehicle.
5. Connect the wiring harness to the power steering pump.

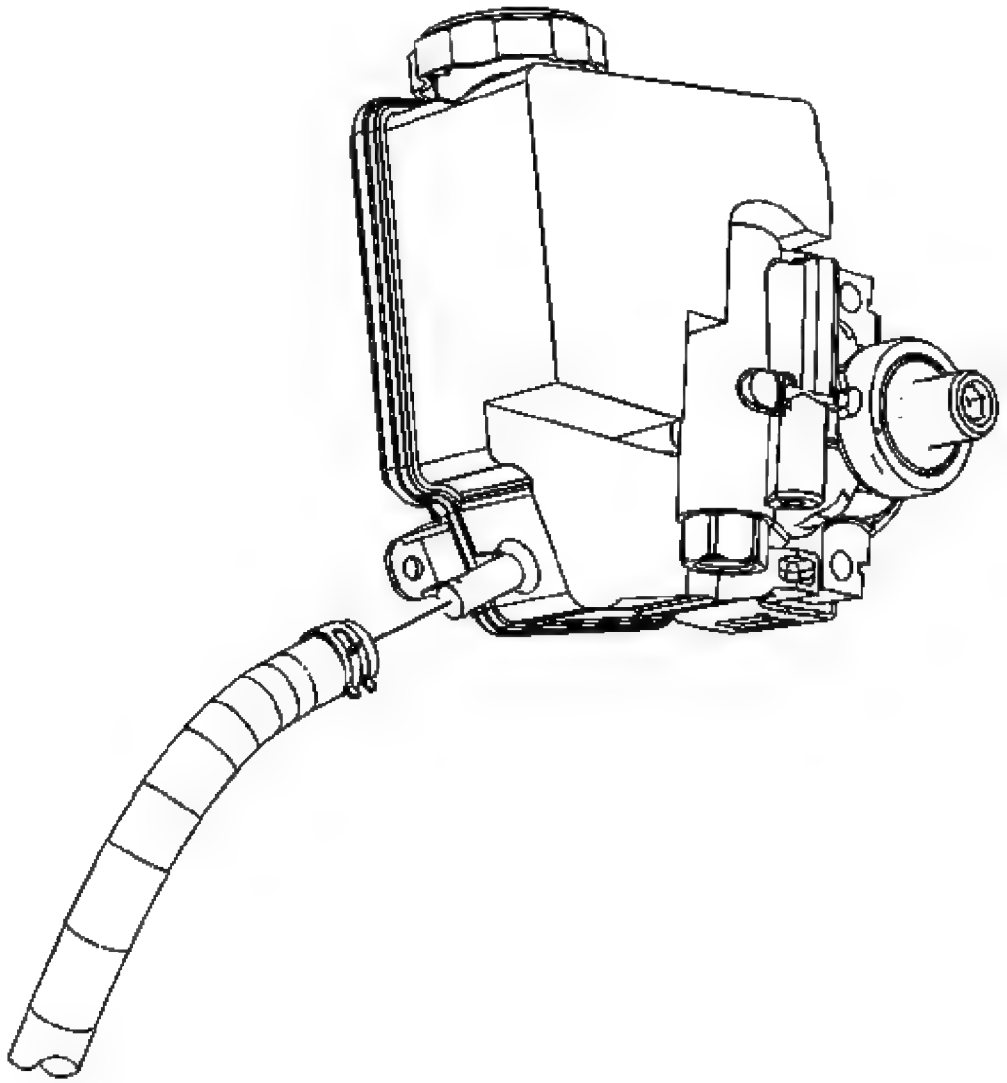


Fig. 32: Identifying Power Steering Return Hose
Courtesy of GENERAL MOTORS CORP.

6. Compress the clamp and connect the power steering return hose to the power steering pump.

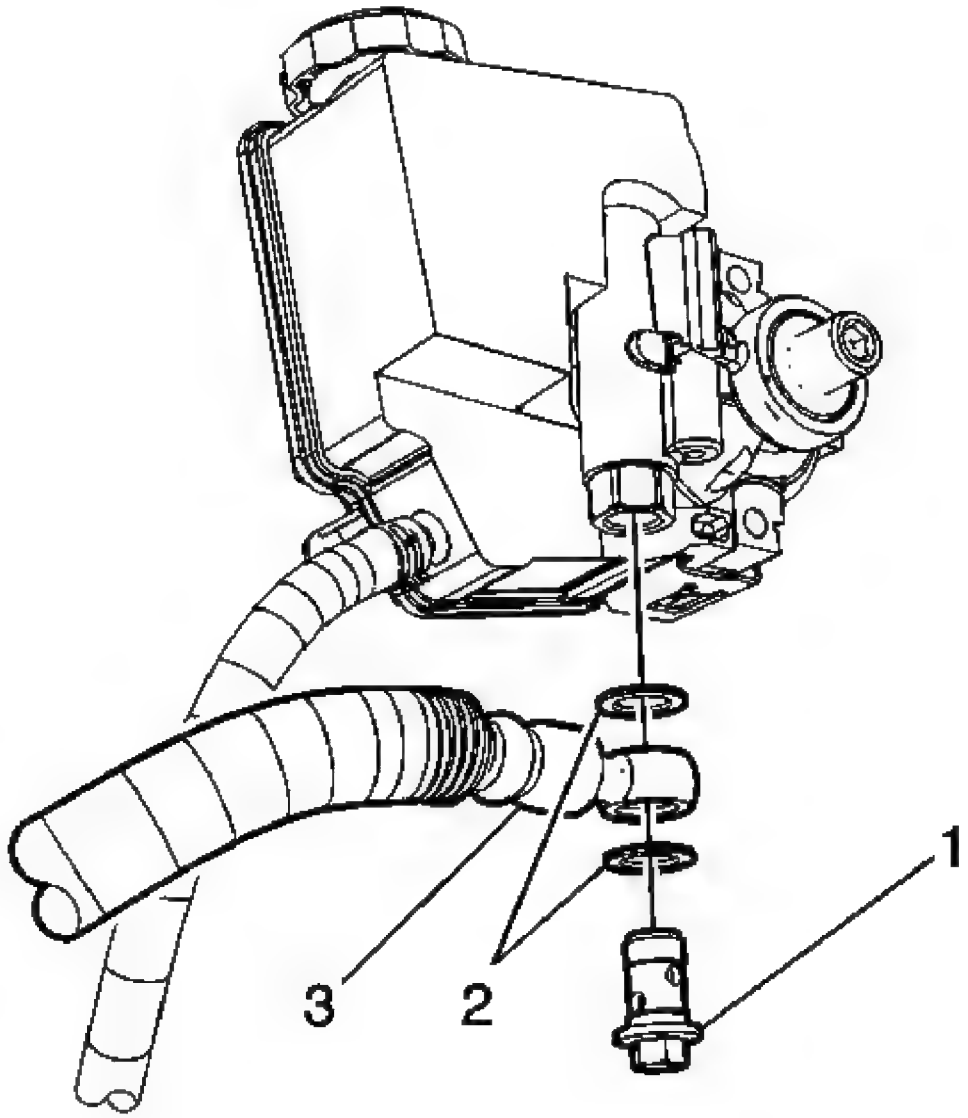


Fig. 33: Identifying Steering Pump Flow Control Valve
Courtesy of GENERAL MOTORS CORP.

7. Position the power steering pressure hose (3) to the power steering pump with the 2 NEW washers (2) and install the banjo bolt (1).

   Tighten: Tighten the power steering pressure hose banjo bolt to 55 N.m (41 lb ft).

8. Lower the vehicle.
9. Install the drive belt. Refer to **Drive Belt Replacement** .

10. Bleed the power steering system. Refer to **Power Steering System Bleeding**.
11. Inspect the power steering system for leaks.

POWER STEERING FLUID RESERVOIR REPLACEMENT - OFF VEHICLE (CB SERIES)

Disassembly Procedure

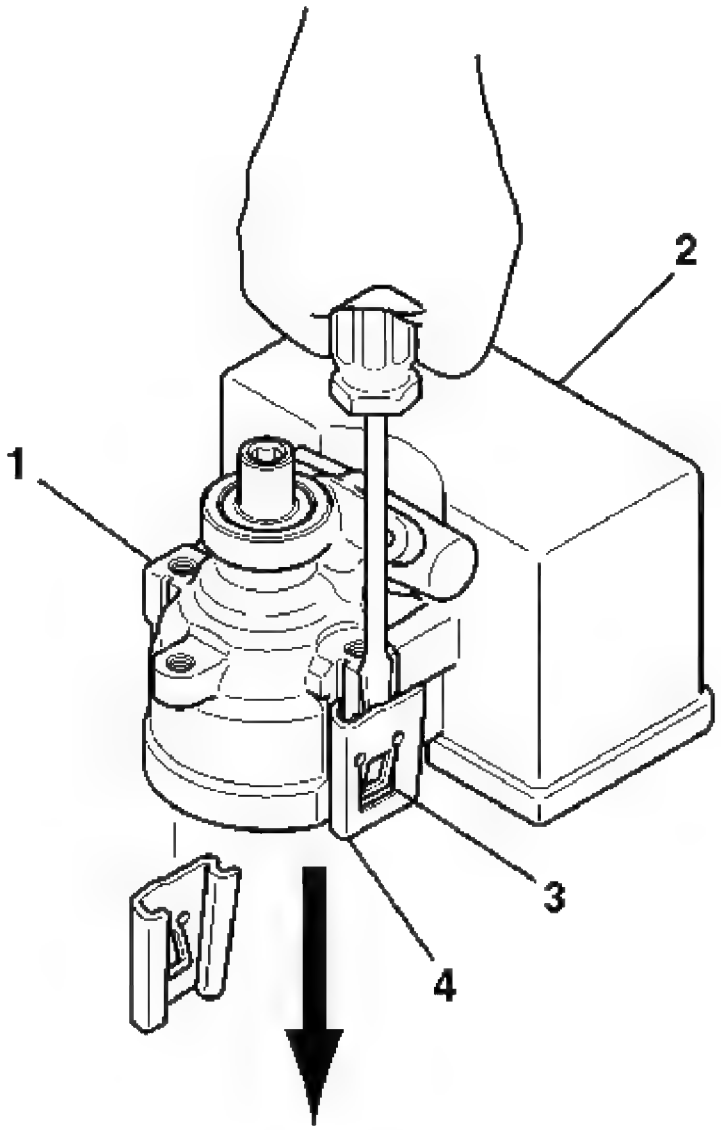


Fig. 34: Removing Power Steering Reservoir (CB Series)
Courtesy of GENERAL MOTORS CORP.

1. Place the hydraulic pump (1) on a fixed, flat surface, with the shaft facing upward.
2. Insert a screwdriver into the retaining clip tab (3).
3. Using the screwdriver, force the retaining clip tab (3) outward.
4. Slide the reservoir clip (4) away from the hydraulic pump assembly (1).
5. Repeat the above steps to remove the second reservoir clip (4).
6. Remove the reservoir (2) from the hydraulic pump housing (1).
7. Remove the O-ring seal from the neck of the reservoir (2) or inside the hydraulic pump housing (1). Discard the O-ring seal.

Assembly Procedure

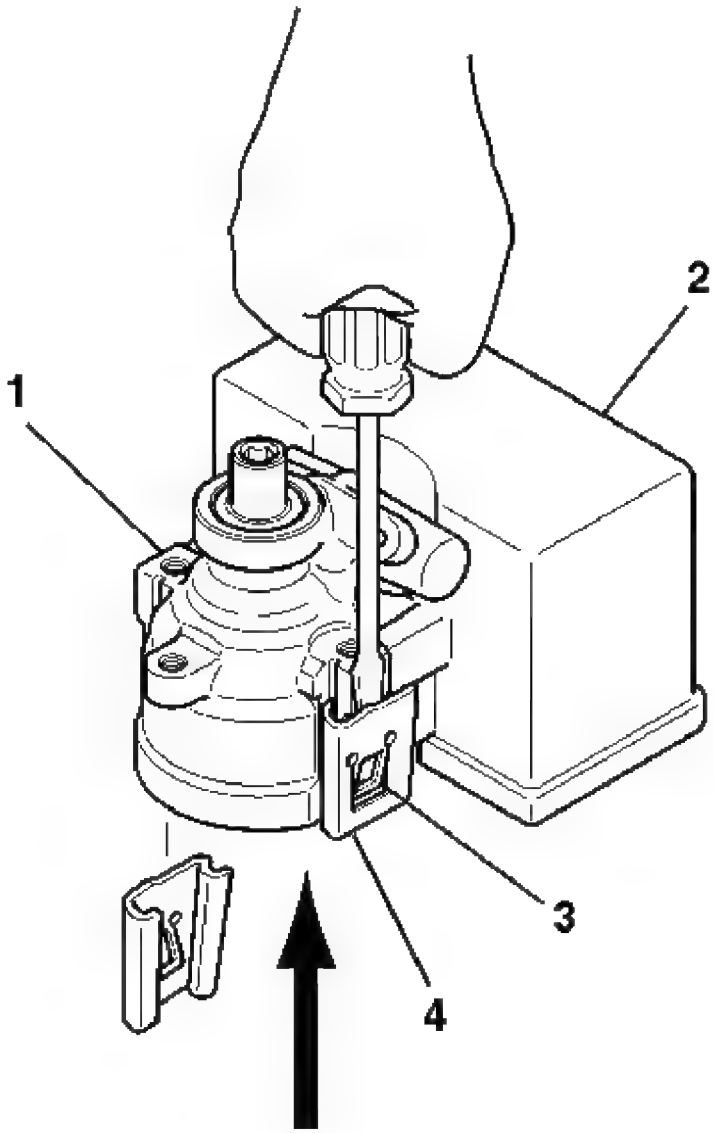


Fig. 35: View Of Power Steering Pump And Reservoir (CB Series)
Courtesy of GENERAL MOTORS CORP.

1. Lubricate the new O-ring seal with power steering fluid.
2. Install the new O-ring seal onto the neck of the reservoir (2).
3. Install the reservoir (2) onto the hydraulic pump assembly (1). Ensure the reservoir neck is completely engaged onto the hydraulic pump assembly (1).
4. Align the feet of the reservoir with the sides of the hydraulic pump housing.

5. Install the new reservoir retaining clips (4) (supplied with the pump). Ensure the retaining clip tabs (3) fully engage with the hydraulic pump housing (1).

POWER STEERING PUMP FLOW CONTROL VALVE REPLACEMENT - OFF VEHICLE (CB (CB SERIES)

Disassembly Procedure

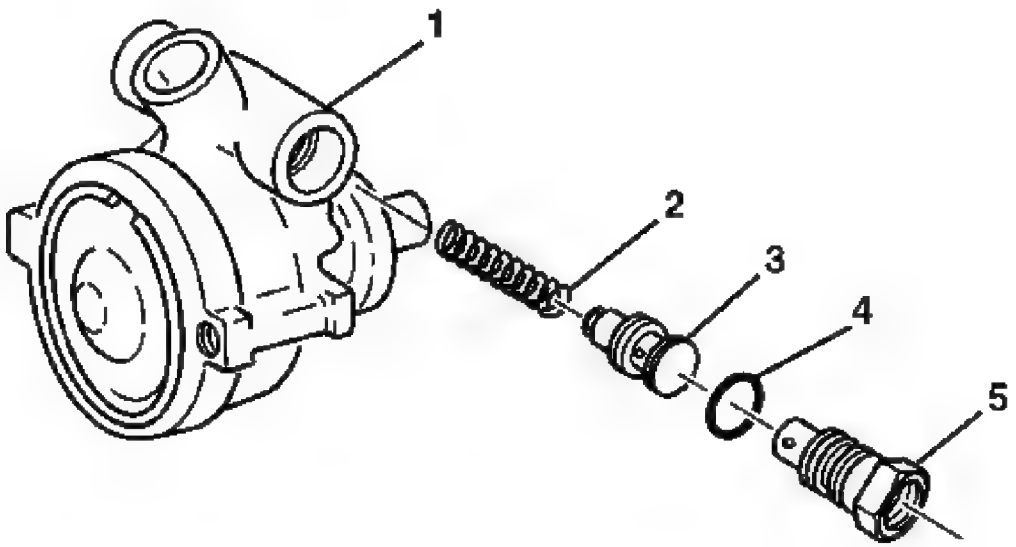


Fig. 36: Exploded View Of Power Steering Pump Flow Control Valve (CB Series)
Courtesy of GENERAL MOTORS CORP.

1. Remove the O-ring union fitting (5) from the hydraulic pump housing assembly (1).
2. Remove the O-ring seal (4) from the O-ring union fitting (5).
3. Remove the control valve assembly (3).
4. Remove the flow control spring (2).

Assembly Procedure

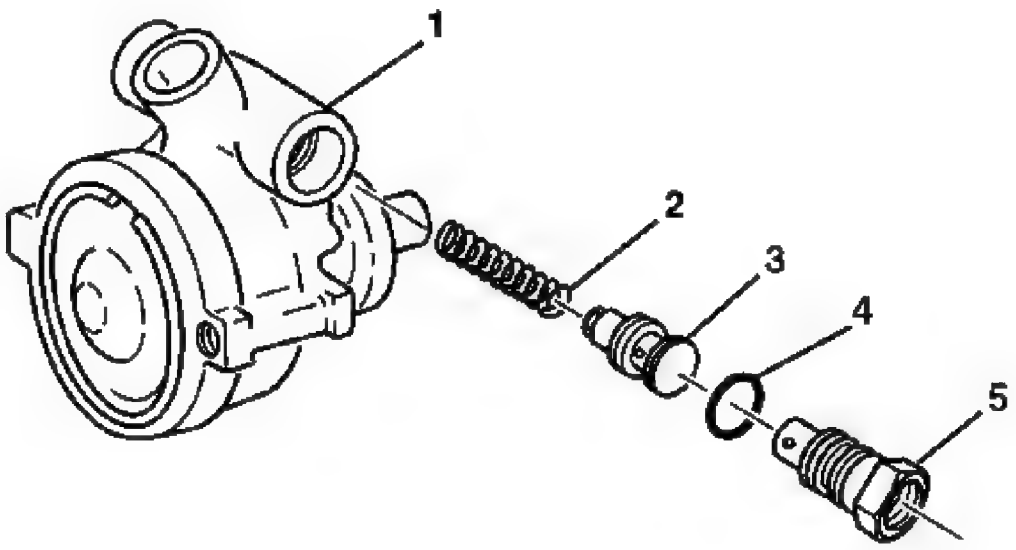


Fig. 37: Exploded View Of Power Steering Pump Flow Control Valve (CB Series)
Courtesy of GENERAL MOTORS CORP.

1. Install the flow control spring (2) to the hydraulic pump housing assembly (1).
2. Install the control valve assembly (3).
3. Lubricate the O-ring seal (4) with power steering fluid.
4. Install the O-ring seal (4) onto the O-ring union fitting (5).

NOTE: Refer to Fastener Notice .

5. Install the O-ring union fitting (5) into the hydraulic pump housing assembly (1).

Tighten: Tighten the fitting (5) to 75 N.m (55 lb ft).

POWER STEERING PUMP SHAFT SEAL REPLACEMENT (CB)

Removal Procedure

1. Remove the power steering pump from the vehicle, if necessary. Refer to **Power Steering Pump Replacement (LD8)** or **Power Steering Pump Replacement (L26)**.

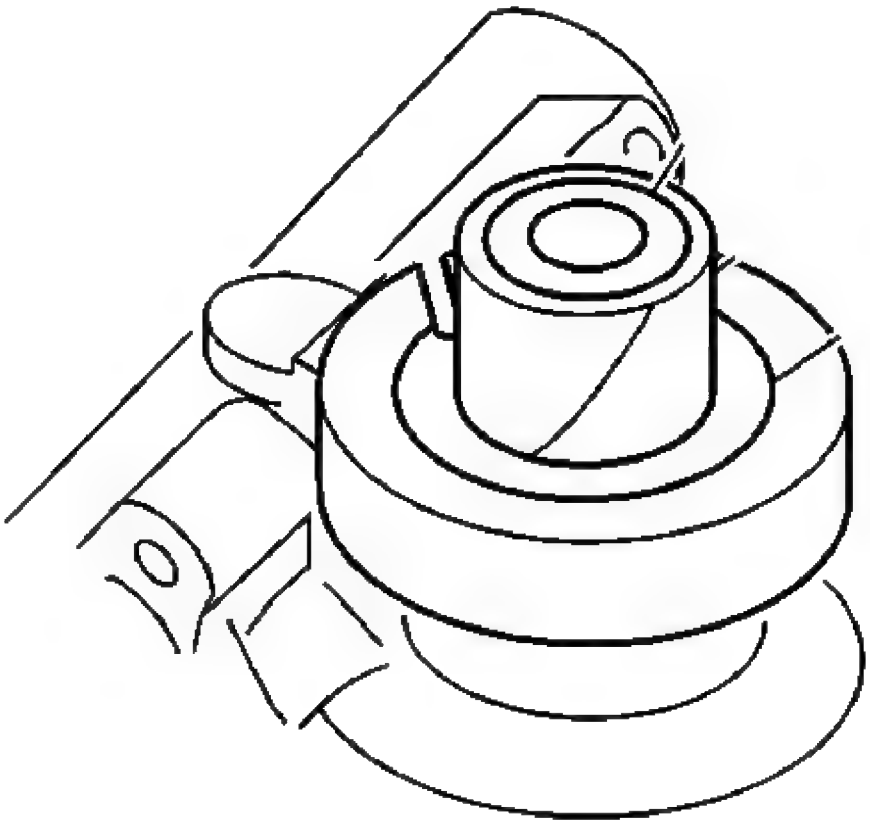


Fig. 38: Identifying Power Steering Pump Drive Shaft Seal
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Protect the drive shaft with the shim stock.

2. Use a small chisel in order to remove the seal.

   Discard the seal.

Installation Procedure

1. Lubricate the new drive shaft seal using power steering fluid.

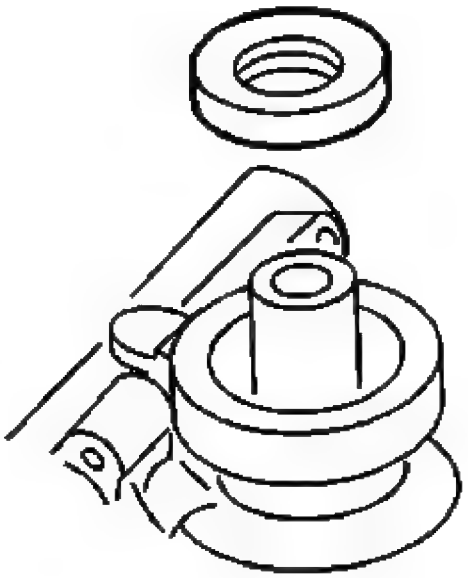


Fig. 39: Identifying Power Steering Pump Drive Shaft Seal
Courtesy of GENERAL MOTORS CORP.

2. Use a deep socket in order to install the new drive shaft seal.
3. Install the power steering pump, if removed. Refer to **Power Steering Pump Replacement (LD8)** or **Power Steering Pump Replacement (L26)**.

RACK AND PINION OUTER TIE ROD END REPLACEMENT

Tools Required

J 24319-B Universal Steering Linkage Puller. See **Special Tools**.

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .

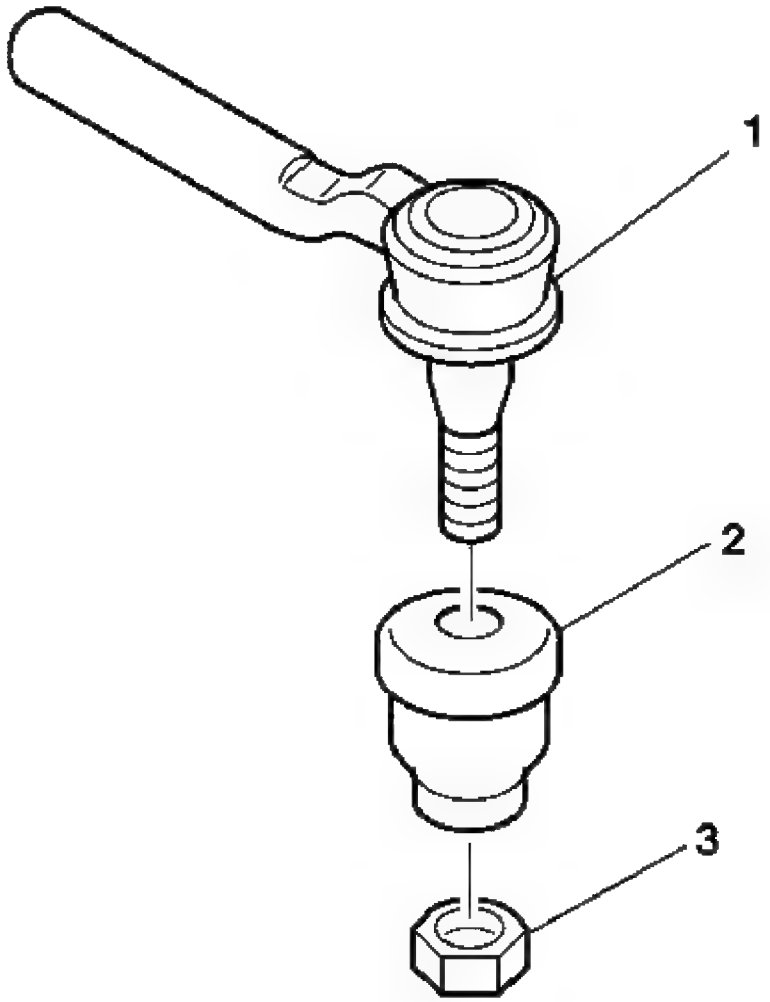


Fig. 40: Removing/Installing Tie Rod Seal To Outer Tie Rod Assembly
Courtesy of GENERAL MOTORS CORP.

3. Remove the lock nut (3) from the outer tie rod (1).

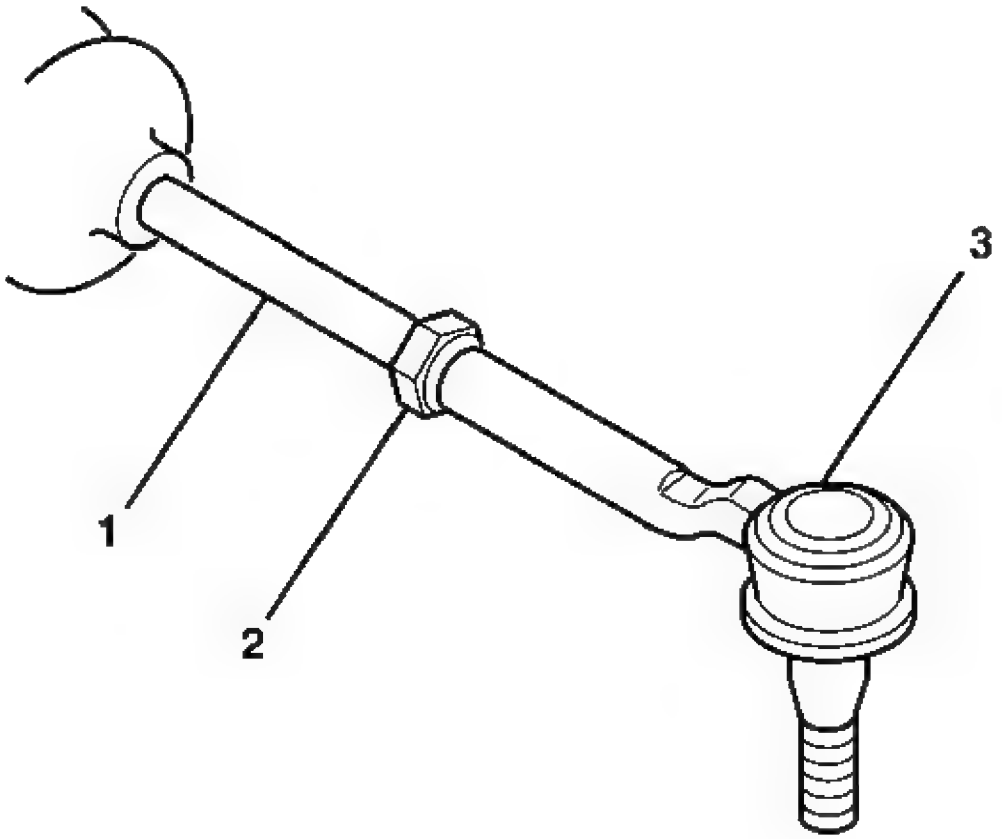


Fig. 41: View of Inner Tie Rod & Jam Nut
Courtesy of GENERAL MOTORS CORP.

4. Loosen the jam nut (2) on the inner tie rod (1).

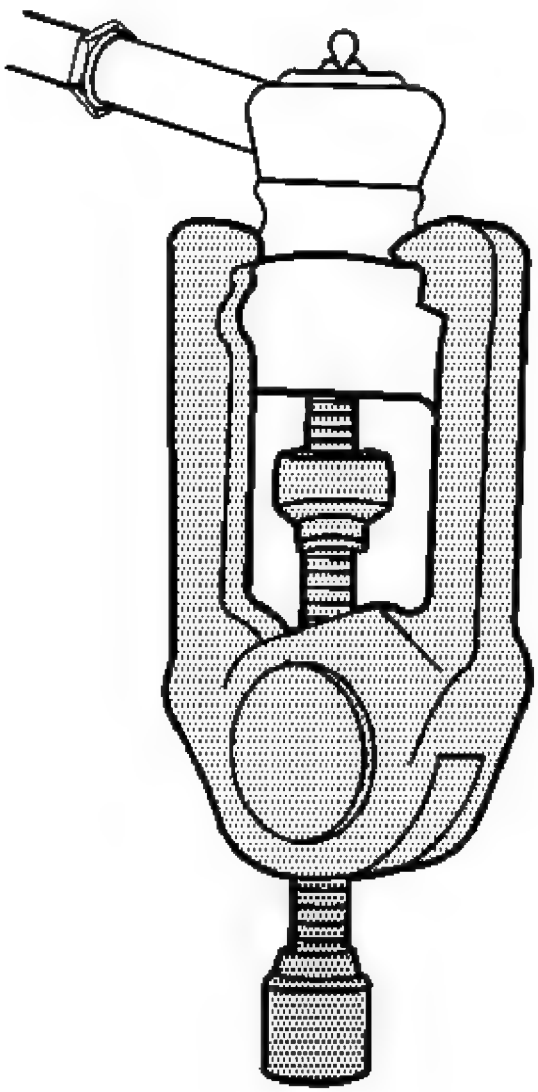


Fig. 42: Removing Outer Tie Rod Assembly From Steering Knuckle
Courtesy of GENERAL MOTORS CORP.

5. Using **J 24319-B** remove the outer tie rod from the steering knuckle. See **Special Tools**.

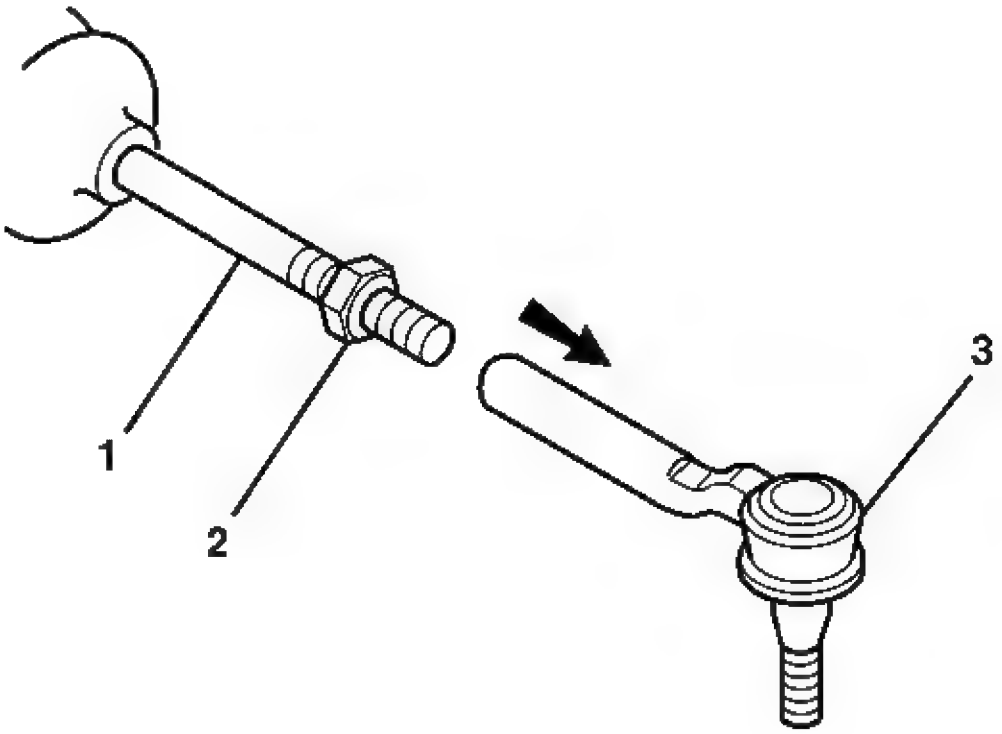


Fig. 43: Removing Outer Tie Rod Assembly From Inner Tie Rod Assembly
Courtesy of GENERAL MOTORS CORP.

6. Remove the outer tie rod (3) from the inner tie rod (1).

Installation Procedure

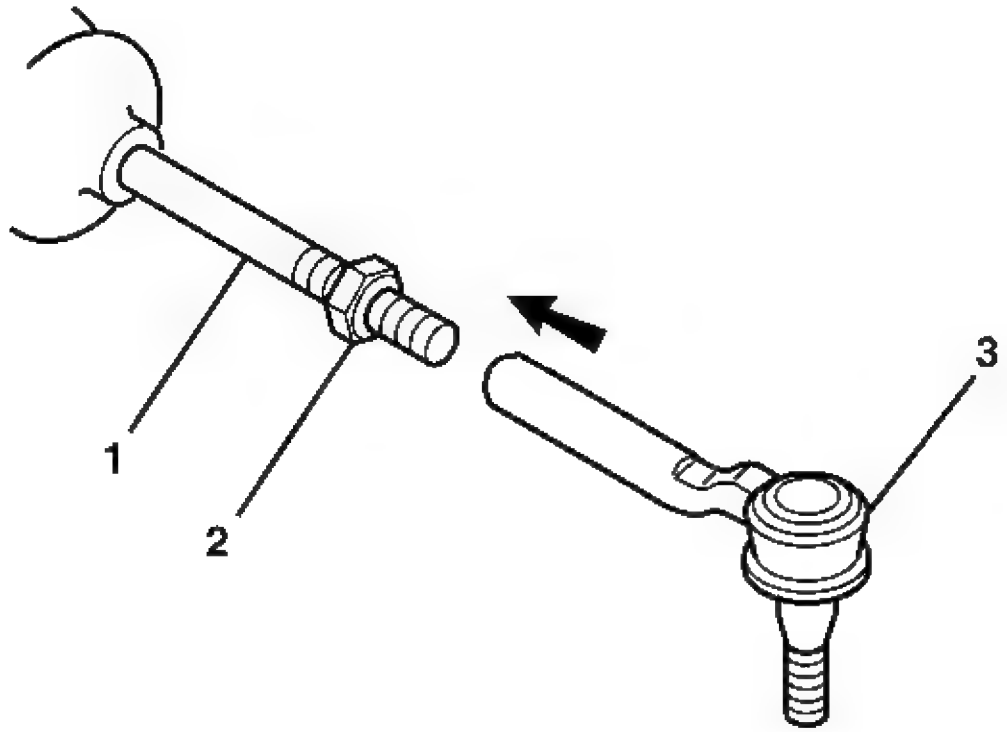


Fig. 44: Connecting Outer Tie Rod Assembly To Inner Tie Rod
Courtesy of GENERAL MOTORS CORP.

1. Install the outer tie rod (3) to the inner tie rod (1). Do not tighten the jam nut (2).

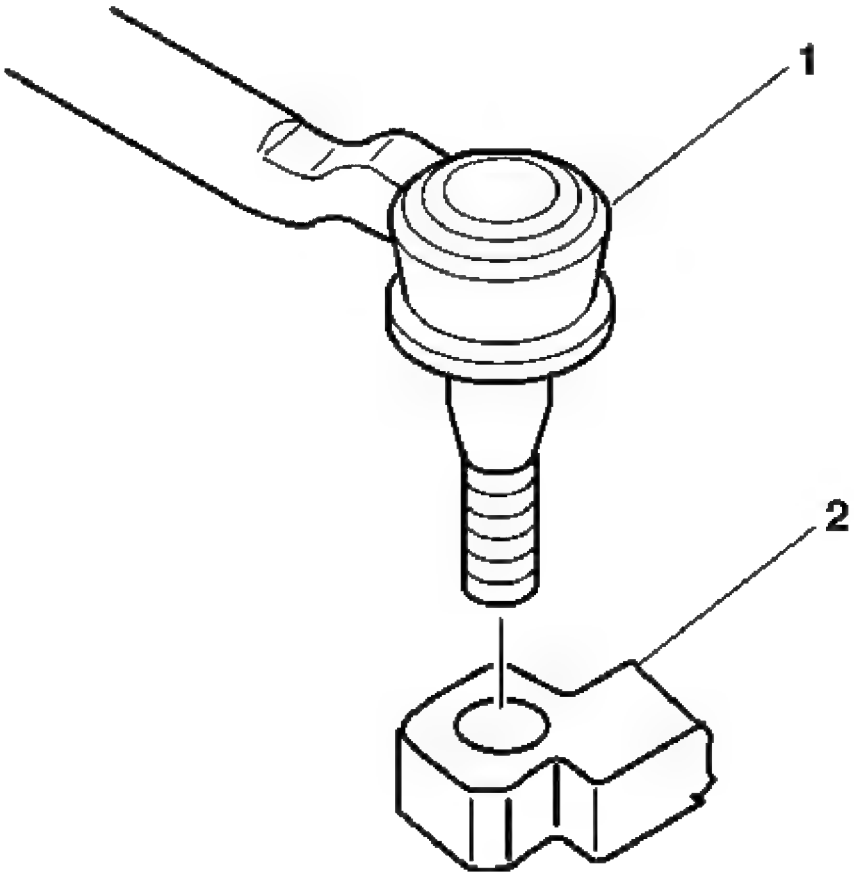


Fig. 45: Installing Right Outer Tie Rod To Steering Knuckle
Courtesy of GENERAL MOTORS CORP.

2. Install the outer tie rod (1) to the steering knuckle (2).

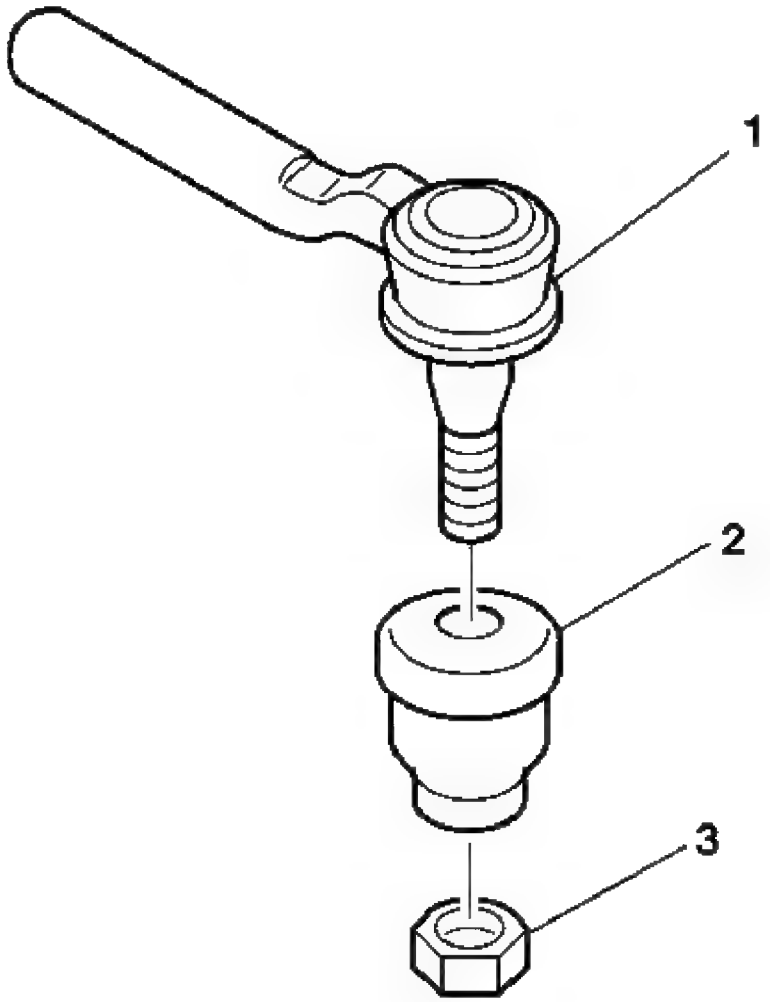


Fig. 46: Removing/Installing Tie Rod Seal To Outer Tie Rod Assembly
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to FASTENER NOTICE .

3. Install the outer tie rod lock nut (3).

   Tighten: Tighten the tie rod lock nut to 30 N.m (22 lb ft) plus an additional 180 degrees.

4. Install the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
5. Lower vehicle.

6. Adjust the toe alignment. Refer to **Front Toe Adjustment** .

RACK AND PINION BOOT REPLACEMENT

Tools Required

J 22610 Keystone Clamp Plier. See **Special Tools**.

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the outer tie rod. Refer to **Rack and Pinion Outer Tie Rod End Replacement**.

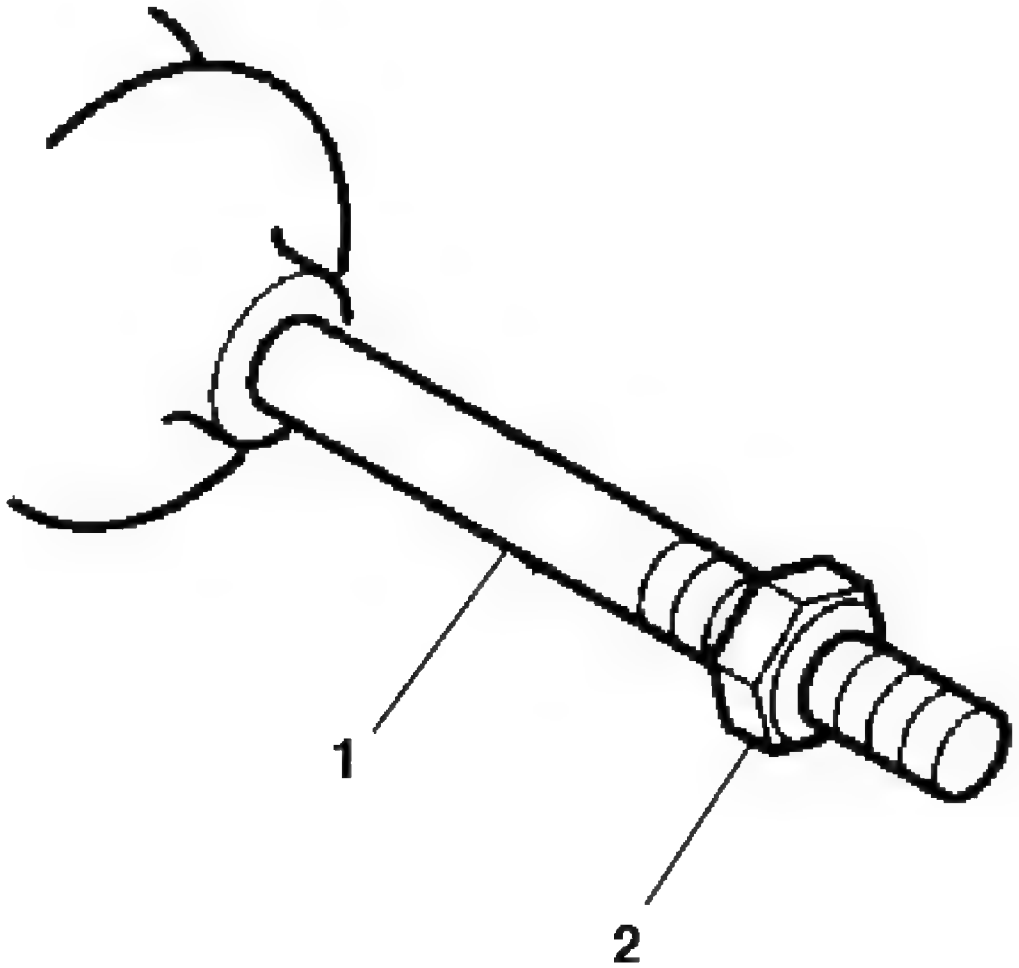


Fig. 47: Identifying Inner Tie Rod Assembly Jam Nut
Courtesy of GENERAL MOTORS CORP.

4. Remove the hex jam nut (2) from the inner tie rod.

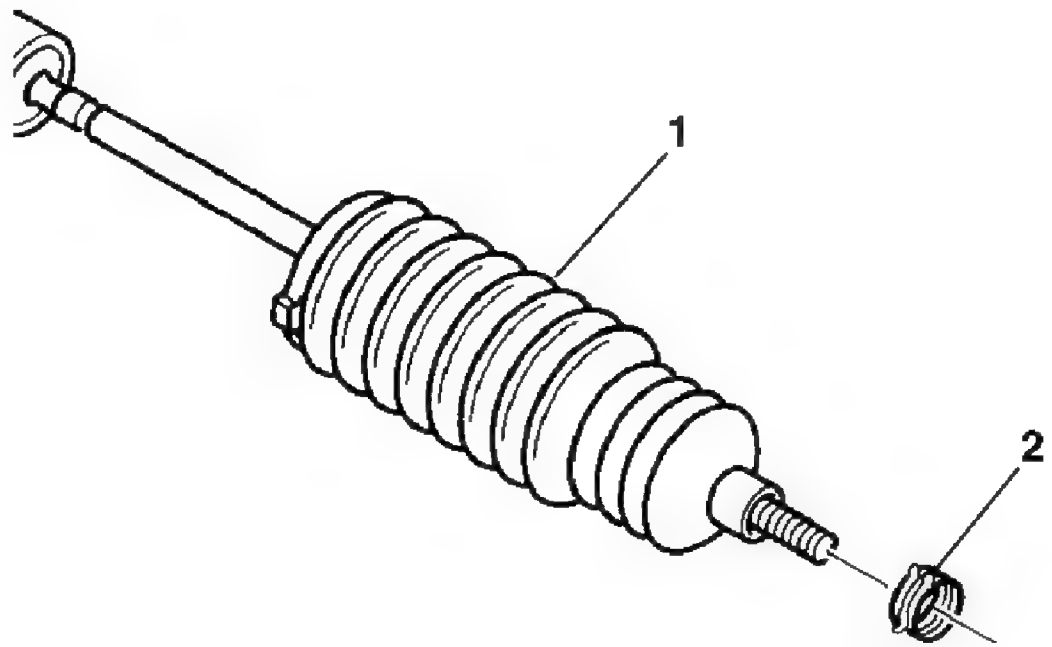


Fig. 48: Removing/Installing Tie Rod End Clamp At Rack & Pinion Boot
Courtesy of GENERAL MOTORS CORP.

5. Remove the tie rod end clamp (2) from the rack and pinion boot (1).
6. Remove the rack and pinion boot clamp from the rack and pinion boot.

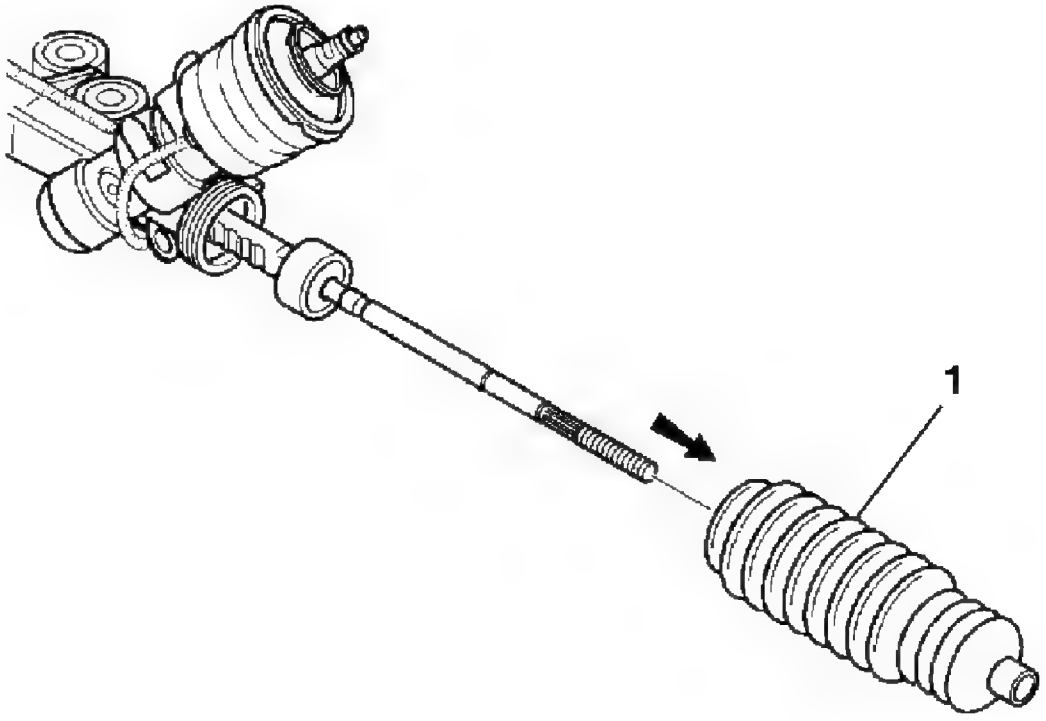


Fig. 49: Removing Rack & Pinion Boot
Courtesy of GENERAL MOTORS CORP.

7. Remove the rack and pinion boot (1) from the steering gear.

Installation Procedure

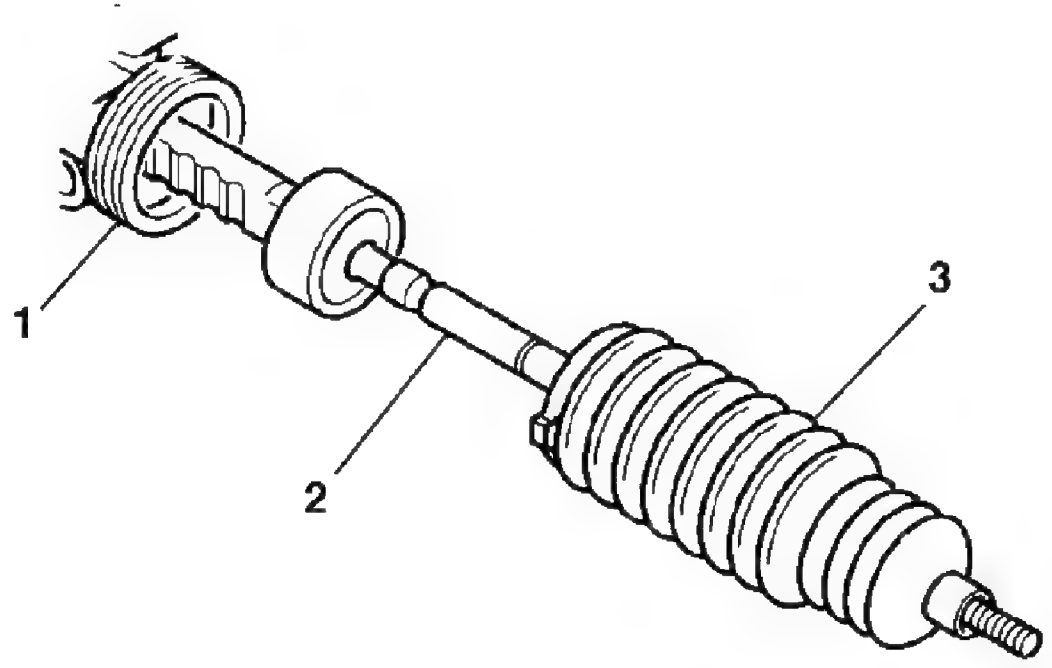


Fig. 50: Installing Rack & Pinion Boot
Courtesy of GENERAL MOTORS CORP.

1. Install the rack and pinion boot (3) to the steering gear.
2. Install a new rack and pinion boot clamp.
3. Using **J 22610** crimp the rack and pinion boot clamp. See **Special Tools**.

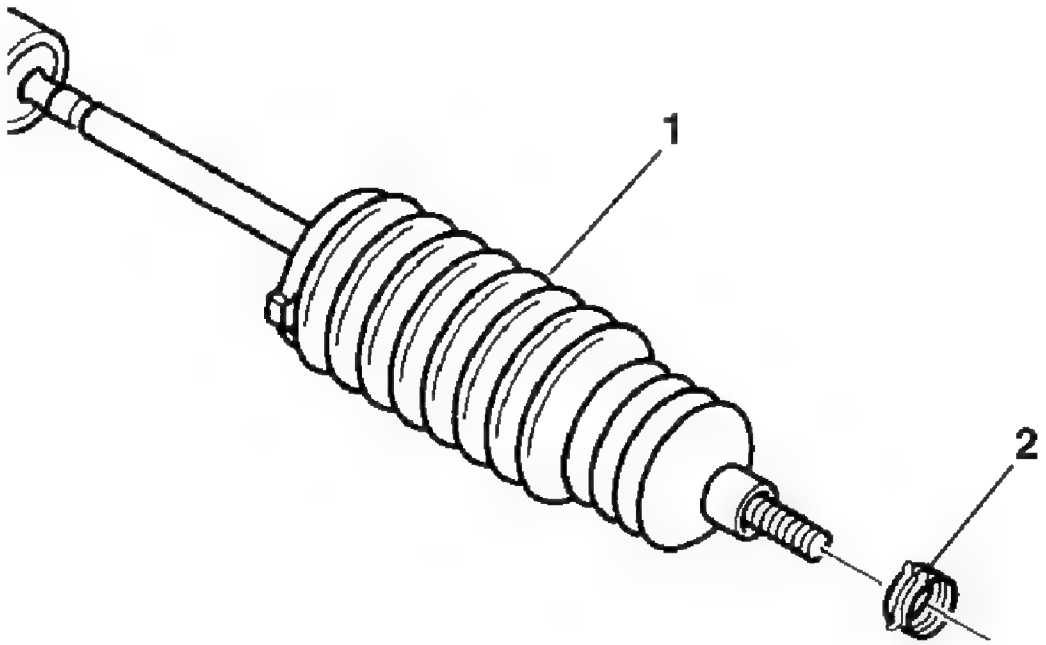


Fig. 51: Removing/Installing Tie Rod End Clamp At Rack & Pinion Boot
Courtesy of GENERAL MOTORS CORP.

4. Install the tie rod end clamp (2) to the rack and pinion boot (1).

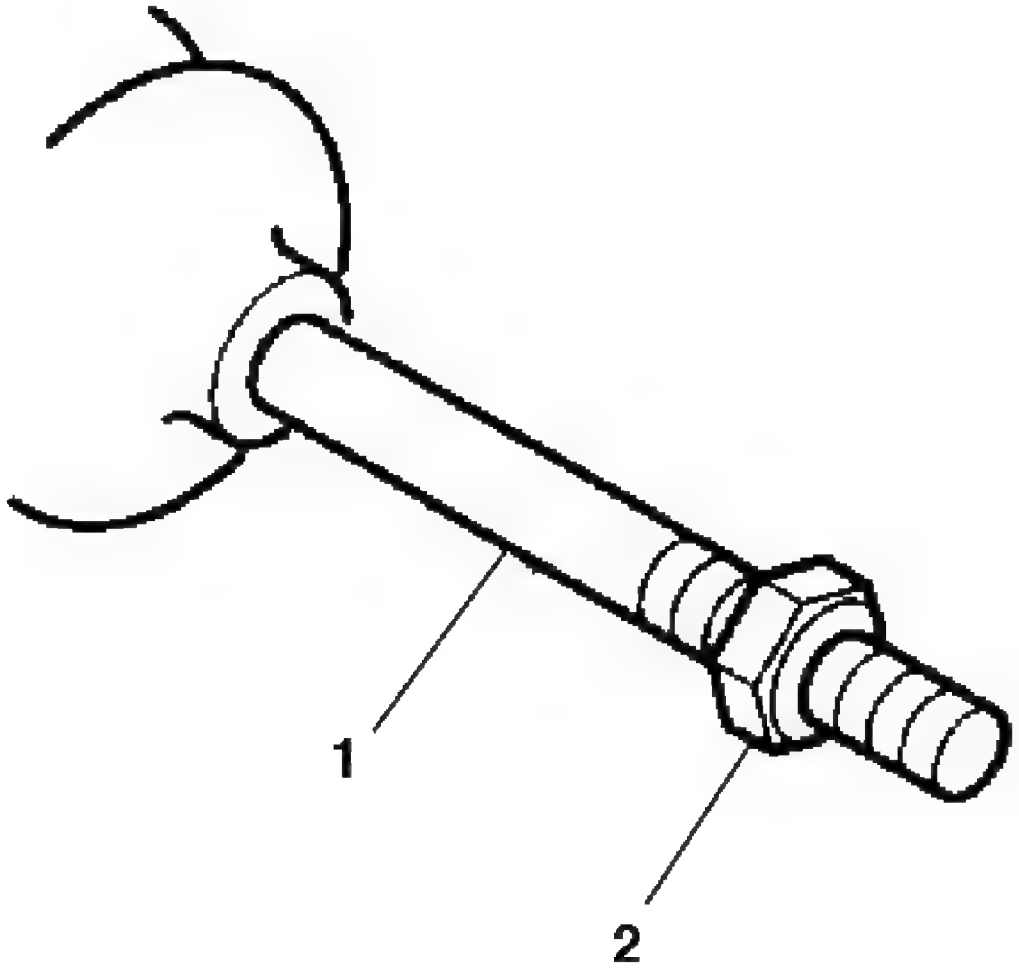


Fig. 52: Identifying Inner Tie Rod Assembly Jam Nut
Courtesy of GENERAL MOTORS CORP.

5. Install the hex jam nut (2) to the inner tie rod assembly.
6. Install the outer tie rod. Refer to **Rack and Pinion Outer Tie Rod End Replacement**.
7. Install the tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
8. Lower the vehicle.
9. Adjust the toe alignment. Refer to **Front Toe Adjustment** .

POWER STEERING PRESSURE PIPE/HOSE REPLACEMENT (RPO L26)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

2. Remove the steering gear heat shield. Refer to **Steering Gear Heat Shield Replacement**
3. Install a drain pan under the vehicle.

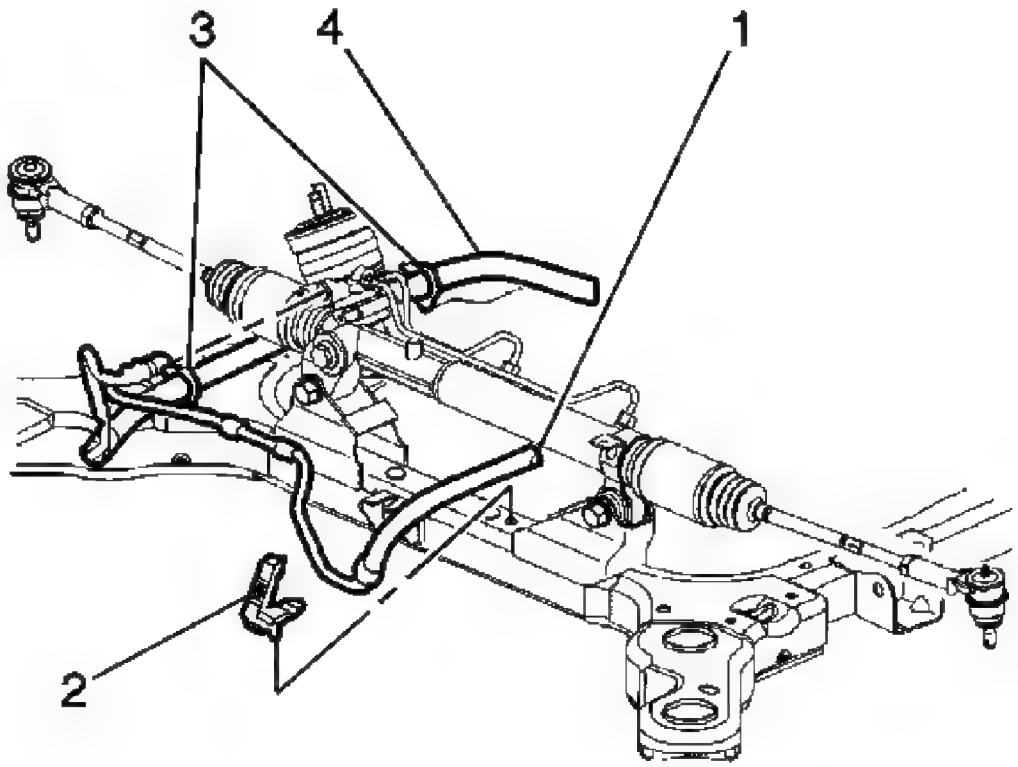


Fig. 53: View Of Steering Rack & Related Components
Courtesy of GENERAL MOTORS CORP.

4. Remove the power steering hose retainer (2) from the engine frame at gear.
5. Remove the power steering pressure hose from the power steering gear.

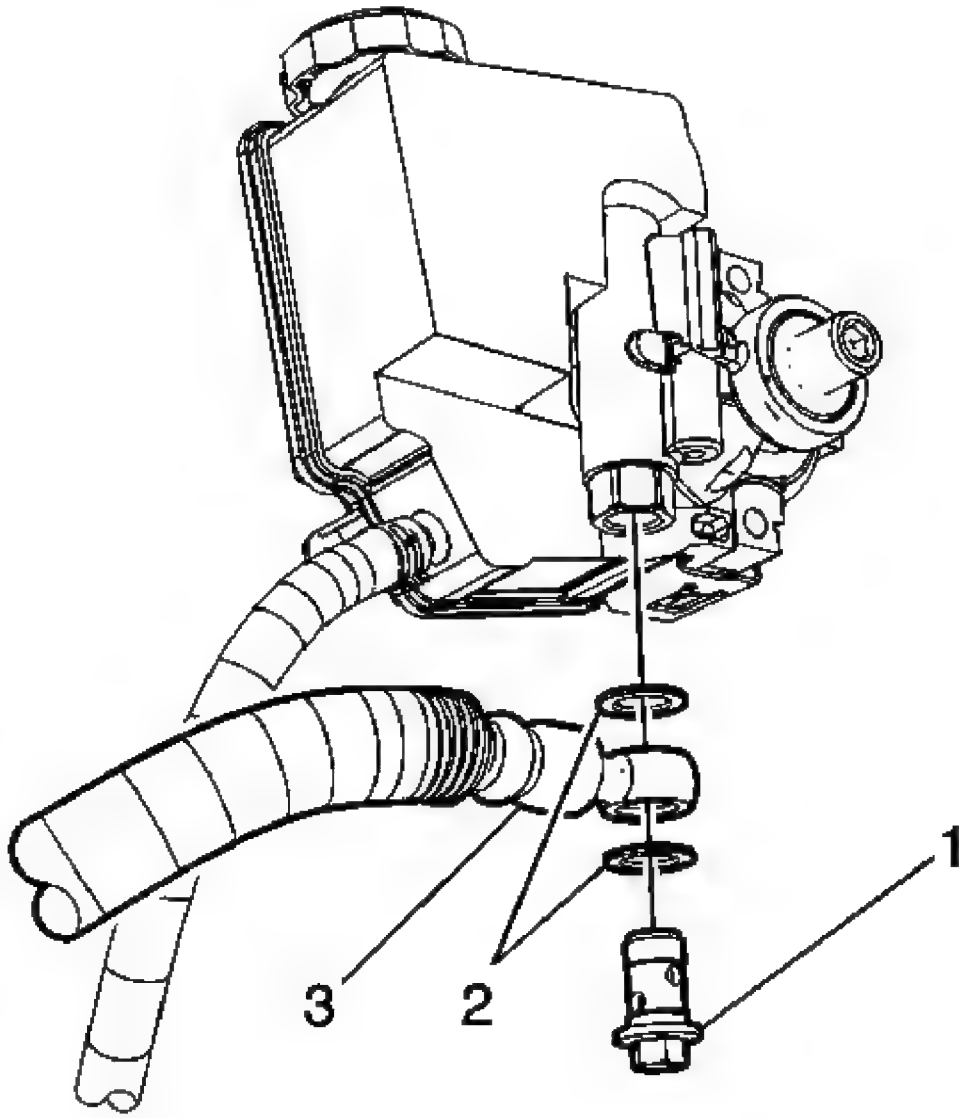


Fig. 54: Identifying Steering Pump Flow Control Valve
Courtesy of GENERAL MOTORS CORP.

6. Remove the power steering pressure hose banjo bolt (1) and remove the 2 washers (2).
7. Remove the power steering pressure hose (3) from the vehicle.

Installation Procedure

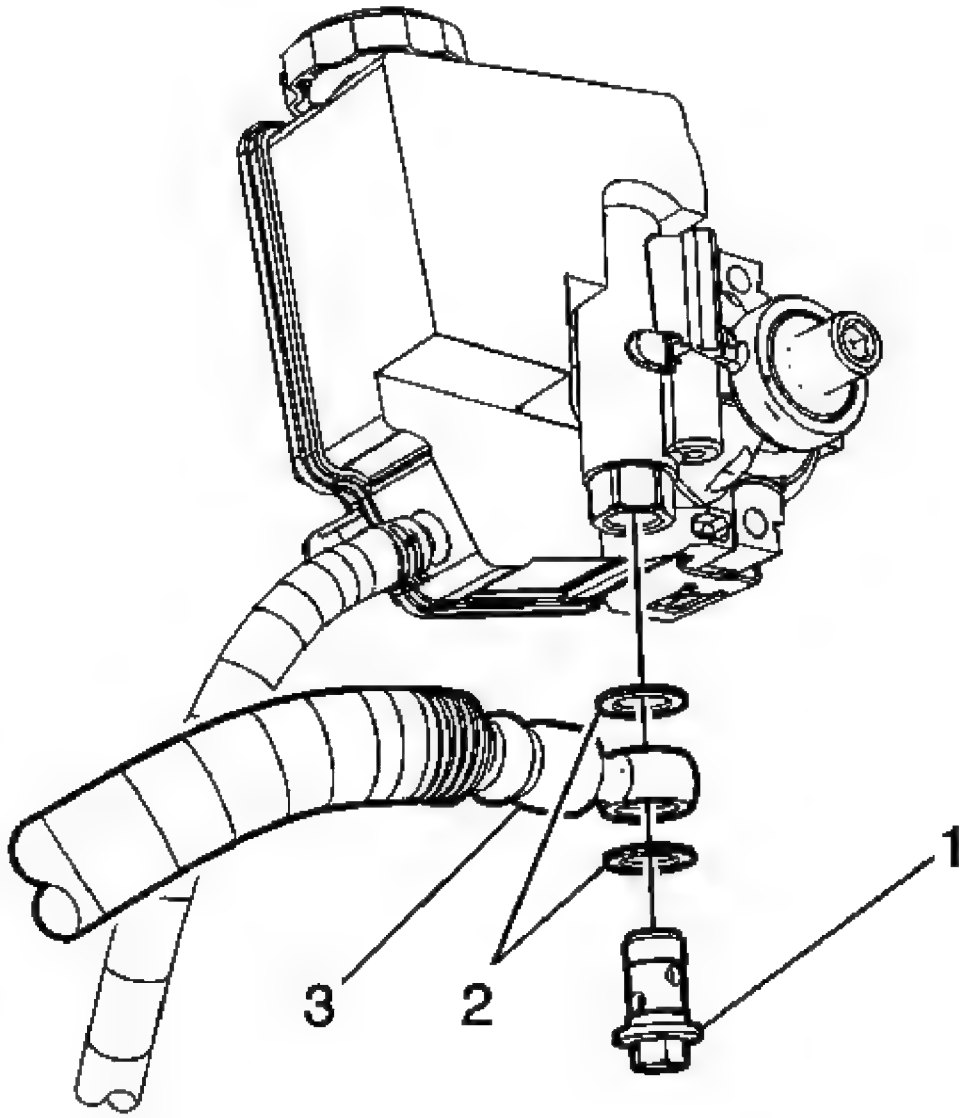


Fig. 55: Identifying Steering Pump Flow Control Valve
Courtesy of GENERAL MOTORS CORP.

1. Install the power steering pressure hose (3) to the vehicle.

NOTE: **Refer to Fastener Notice .**

2. Install the power steering pressure hose banjo bolt (1) with 2 NEW washers (2).

Tighten: Tighten the power steering pressure hose banjo bolt 55 N.m (41 lb ft).

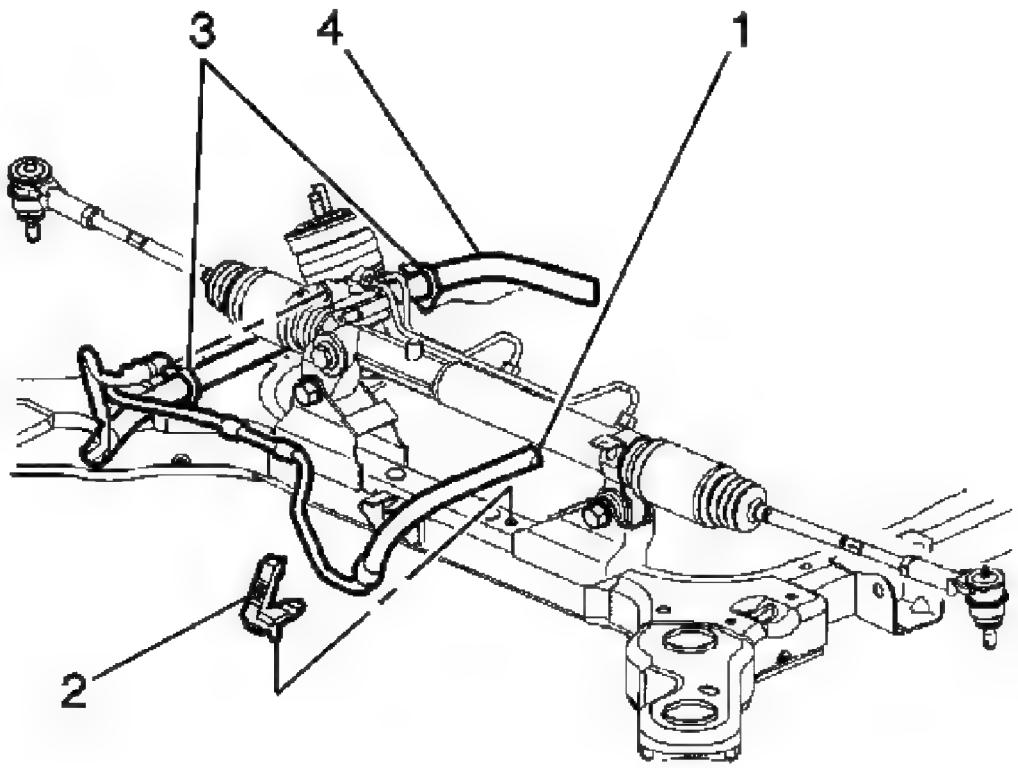


Fig. 56: View Of Steering Rack & Related Components
Courtesy of GENERAL MOTORS CORP.

3. Install the power steering pressure hose to the power steering gear.

   Tighten: Tighten the power steering pressure hose to the power steering gear to 30 N.m (22 lb ft).

4. Install the power steering hose retainer (2) to the engine frame.
5. Install the power steering pressure hose into the power steering hose retainer.
6. Install the power steering gear heat shield. Refer to **Steering Gear Heat Shield Replacement**.
7. Lower the vehicle.
8. Bleed the power steering system. Refer to **Power Steering System Bleeding**.

POWER STEERING PRESSURE PIPE/HOSE REPLACEMENT (RPO LD8)

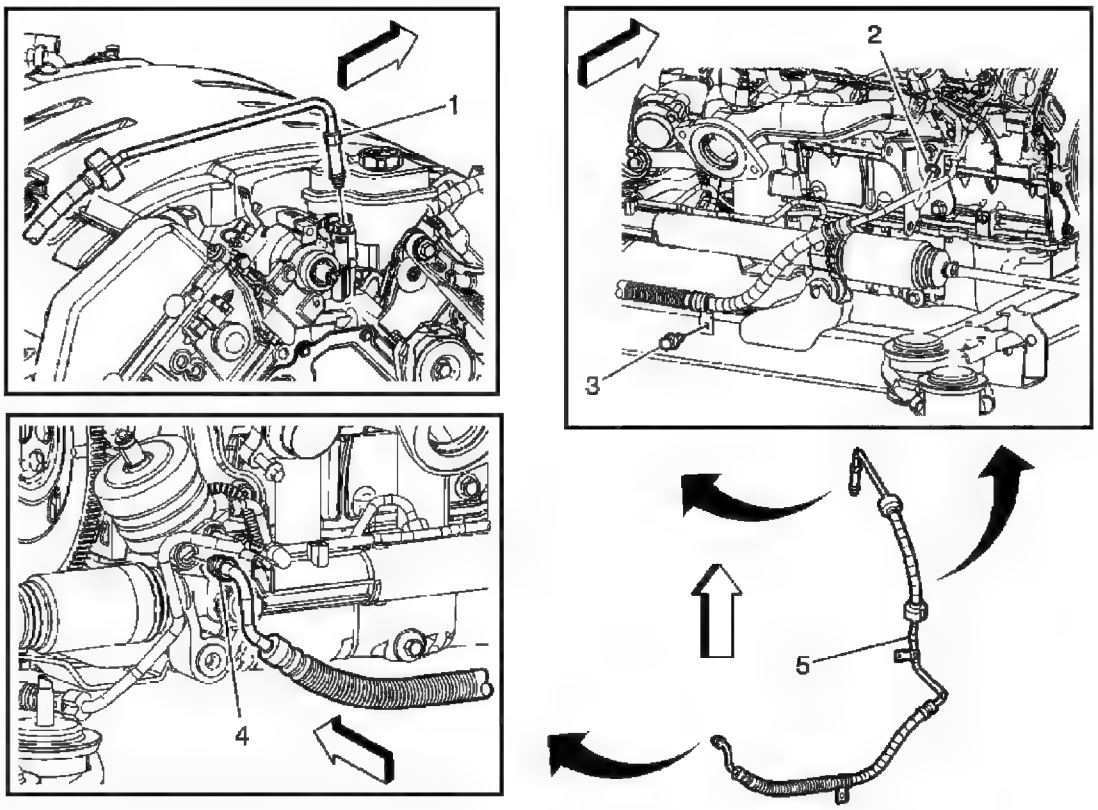


Fig. 57: Removing/Installing Power Steering Hose
Courtesy of GENERAL MOTORS CORP.

Power Steering Pressure Pipe/Hose Replacement (RPO LD8)

Callout	Component Name
NOTE: **Refer to Fastener Notice .** **Fastener Tightening Specifications:** Refer to **Fastener Tightening Specifications**. **Preliminary Procedures** 1. Place a drain pan under the vehicle. 2. Raise and lower the vehicle as necessary to access the power steering hose fitting at the rack and pinion. Refer to **Lifting and Jacking the Vehicle** . 3. Remove the Power Steering Gear Heat Shield. Refer to **Steering Gear Heat Shield Replacement**. 4. Fill and bleed the power steering system after the repair has been completed. Refer to **Power Steering System Bleeding**.	
1	Power Steering Pressure Hose Fitting (at pump)

	Tighten: 30 N.m (22 lb ft)
2	Power Steering Pressure Hose Bracket Nut **Tighten:** 9 N.m (80 lb in)
3	Power Steering Pressure Hose Push-In Retainer **Tip:** Remove the push-in retainer from the bracket.
4	Power Steering Pressure Hose Fitting (at rack and pinion) **Tighten:** 30 N.m (22 lb ft)
5	Power Steering Pressure Hose **Tip:** Release the hose from the retainers to remove it from the vehicle.

POWER STEERING RETURN HOSE REPLACEMENT (RPO L26)

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the power steering gear heat shield. Refer to **Steering Gear Heat Shield Replacement**.
3. Install a drain pan under the vehicle.

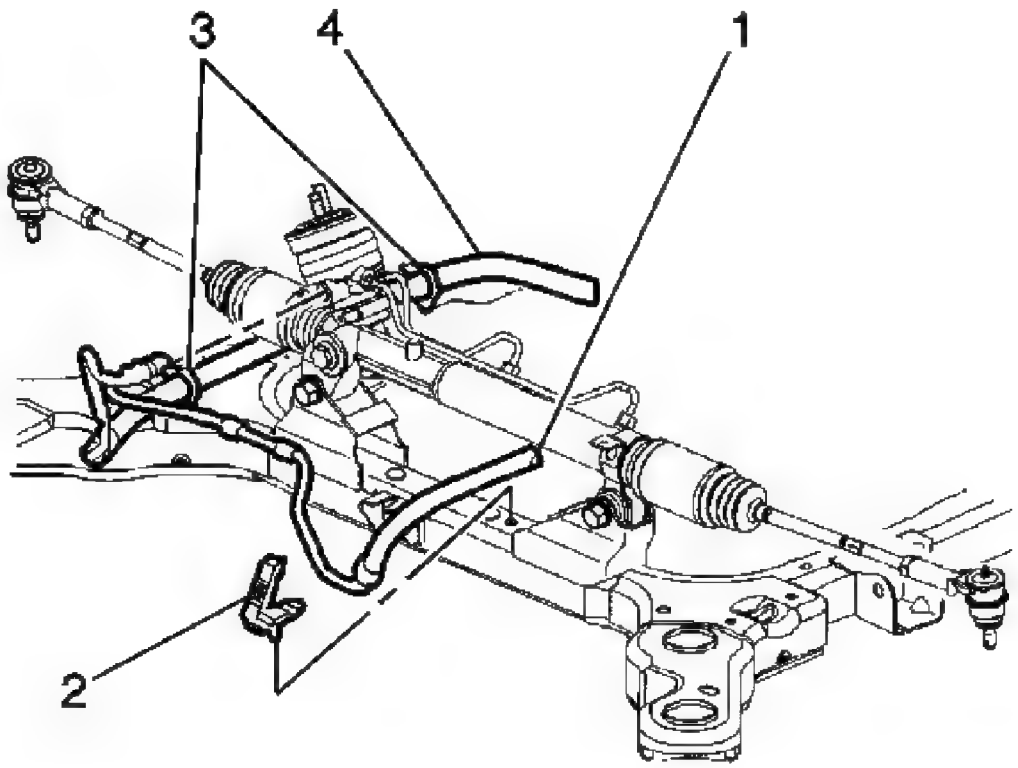


Fig. 58: View Of Steering Rack & Related Components
Courtesy of GENERAL MOTORS CORP.

4. Remove the power steering return hose (4) from the power steering gear.

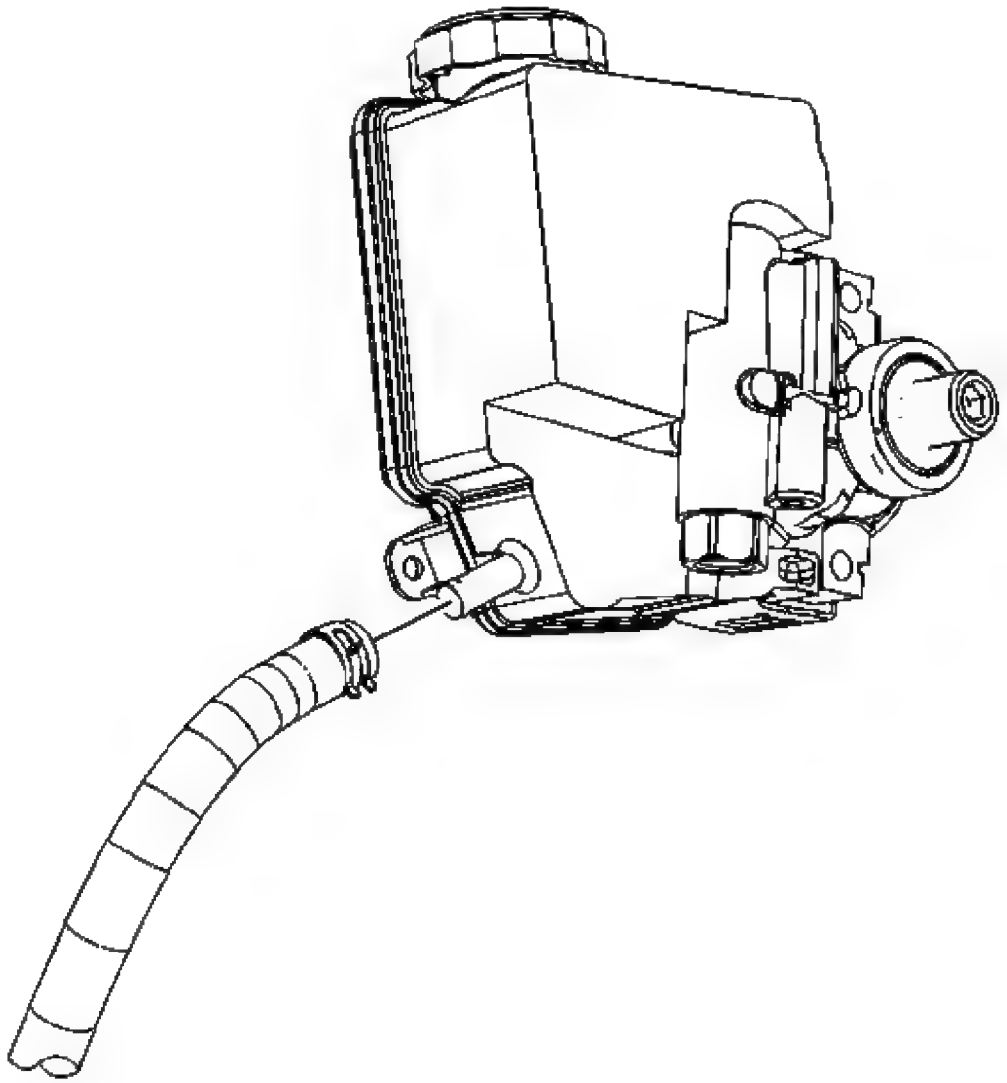


Fig. 59: Identifying Power Steering Return Hose
Courtesy of GENERAL MOTORS CORP.

5. Compress the clamp and disconnect the power steering return hose from the power steering pump.

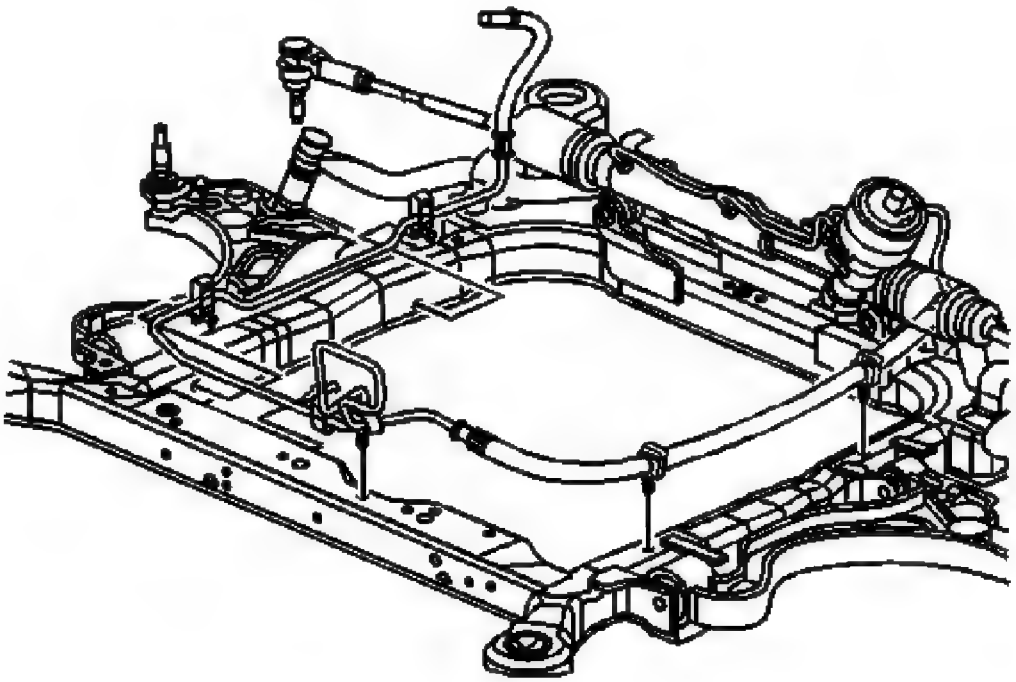


Fig. 60: Removing/Installing Power Steering Return Hose
Courtesy of GENERAL MOTORS CORP.

6. Remove the power steering return hose retainers on the frame.
7. Remove the power steering return hose from the vehicle.

Installation Procedure

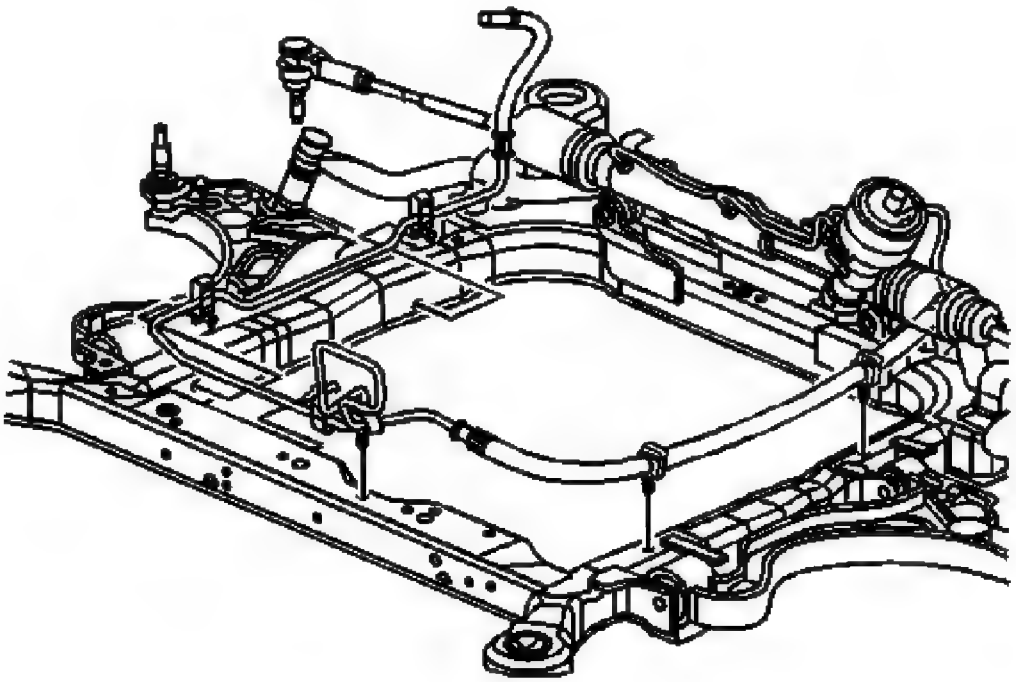


Fig. 61: Removing/Installing Power Steering Return Hose
Courtesy of GENERAL MOTORS CORP.

1. Install the power steering return hose to the vehicle.
2. Connect the power steering return hose retainers to the frame.

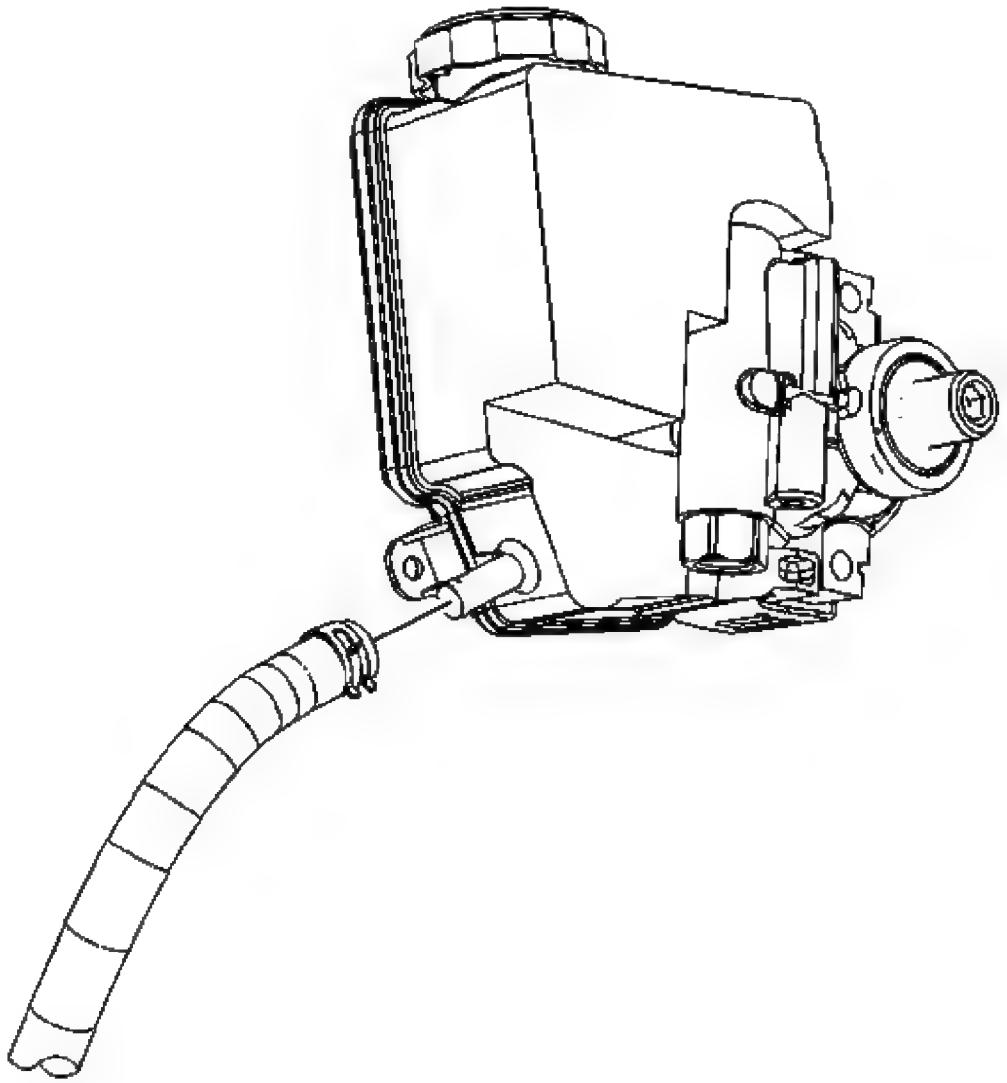


Fig. 62: Identifying Power Steering Return Hose
Courtesy of GENERAL MOTORS CORP.

3. Compress the clamp and install the power steering return hose to the power steering pump.

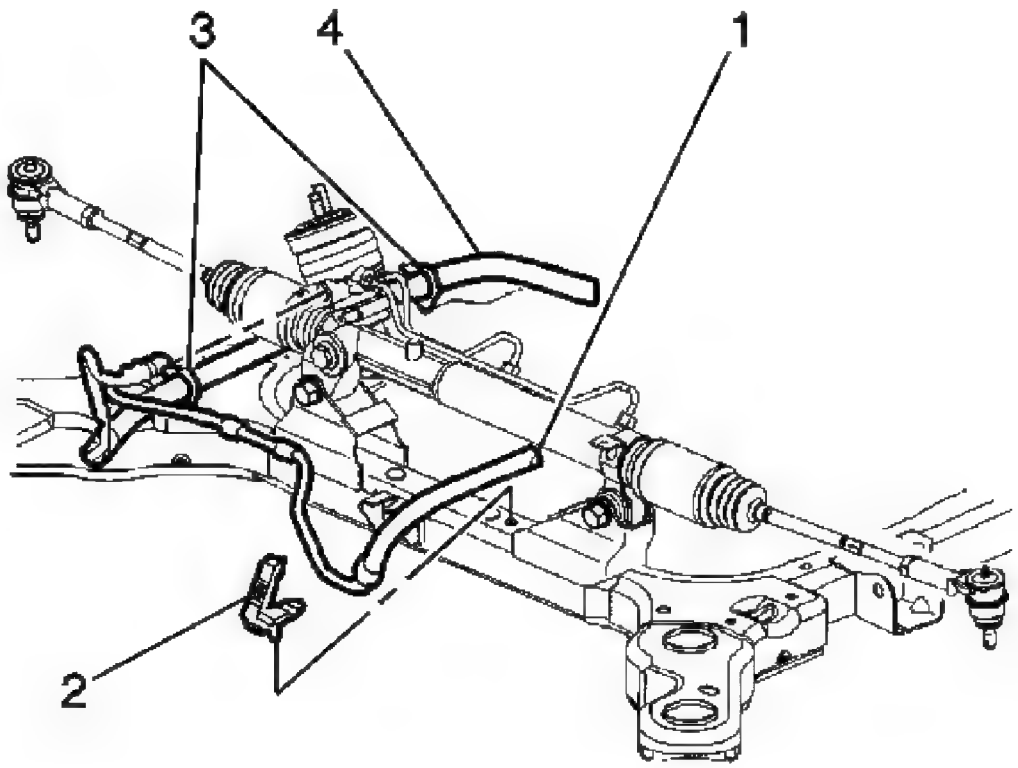


Fig. 63: View Of Steering Rack & Related Components
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

4. Install the power steering return hose (4) to the power steering gear.

   Tighten: Tighten the power steering return hose to the power steering gear to 30 N.m (22 lb ft).

5. Install the power steering gear heat shield. Refer to **Steering Gear Heat Shield Replacement**.
6. Lower the vehicle.
7. Bleed the power steering system. Refer to **Power Steering System Bleeding**.
8. Inspect the power steering system for leaks.

POWER STEERING RETURN HOSE REPLACEMENT (RPO LD8)

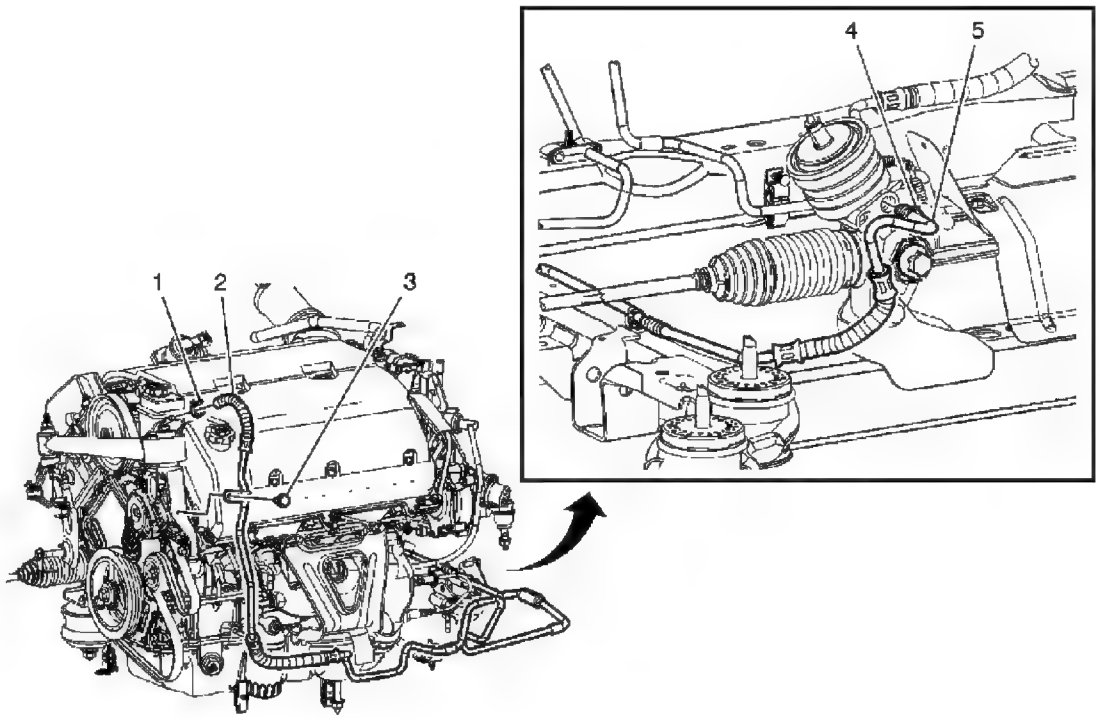


Fig. 64: Removing/Installing Power Steering Return Hose (RPO LD8)
Courtesy of GENERAL MOTORS CORP.

Power Steering Return Hose Replacement (RPO LD8)

Callout	Component Name
NOTE: Refer to Fastener Notice . **Fastener Tightening Specifications:** Refer to **Fastener Tightening Specifications**. **Preliminary Procedures** 1. Place a drain pan under the vehicle. 2. Raise and lower the vehicle as necessary to access the power steering hose fitting at the rack and pinion. Refer to **Lifting and Jacking the Vehicle** . 3. Remove the Power Steering Gear Heat Shield. Refer to **Steering Gear Heat Shield Replacement**. 4. Fill and bleed the power steering system after the repair has been completed. Refer to **Power Steering System Bleeding**.	
1	Power Steering Return Hose Clamp (at pump) **Tip:** Release the clamp to remove the hose form the pump fitting.
2	Power Steering Return Hose (at pump) **Tip:** Pull the power steering return hose off of the pump fitting.

3	Power Steering Return Hose Bracket Bolt **Tighten:** 9 N.m (80 lb in)
4	Power Steering Return Hose Fitting (at rack and pinion) **Tighten:** 30 N.m (22 lb ft)
5	Power Steering Return Hose **Tip:** Release the hose from the retainers to remove it from the vehicle.

STEERING GEAR HEAT SHIELD REPLACEMENT

Removal Procedure

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
    1. Remove the stabilizer shaft links. Refer to **Stabilizer Shaft Link Replacement** .
    2. Rotate the stabilizer shaft downwards.

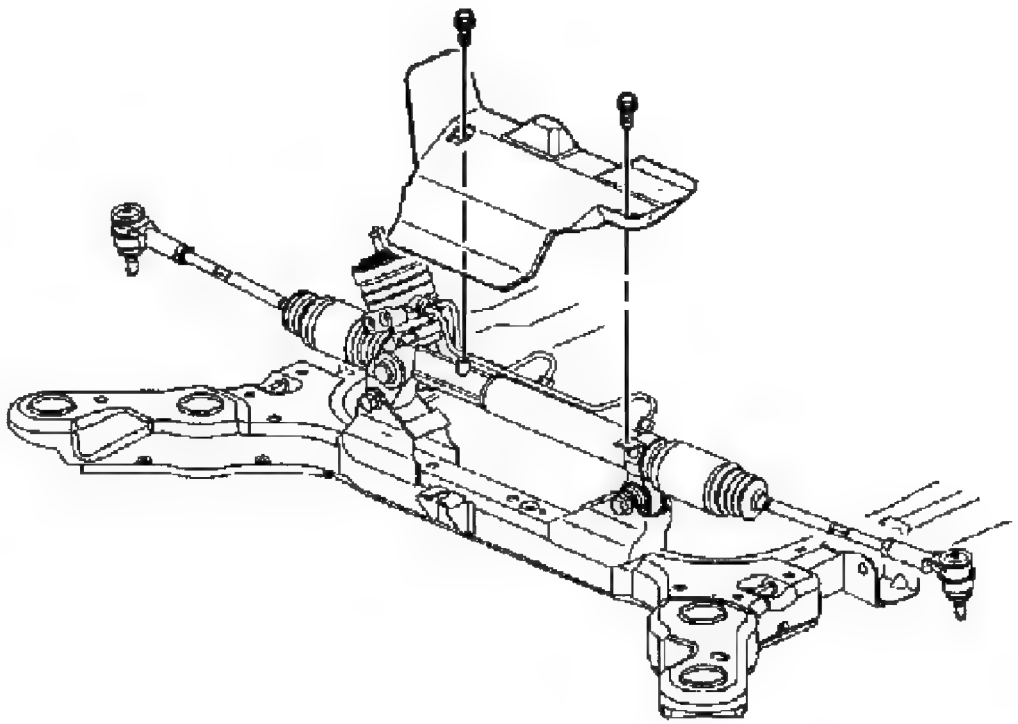


Fig. 65: Removing/Installing Steering Rack
Courtesy of GENERAL MOTORS CORP.

2. Remove the plastic clip from the power steering gear heat shield.
3. Remove the power steering gear heat shield retaining bolts.
4. Remove the power steering gear heat shield.

Installation Procedure

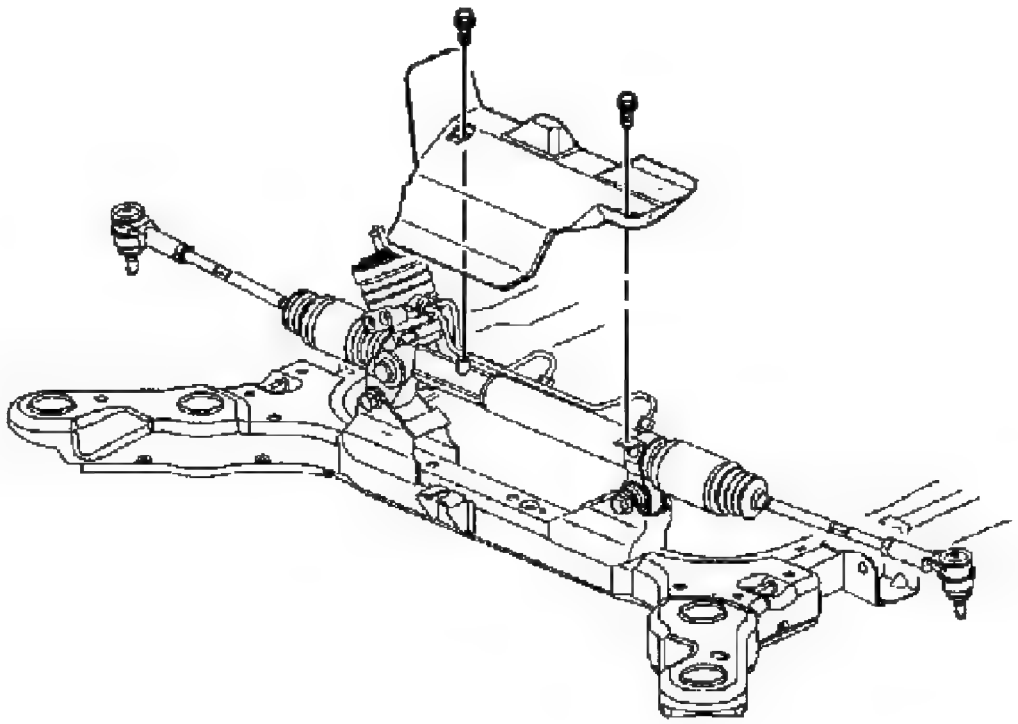


Fig. 66: Removing/Installing Steering Rack
Courtesy of GENERAL MOTORS CORP.

1. Install the power steering gear heat shield.

NOTE: **Refer to FASTENER NOTICE .**

2. Install the power steering gear heat shield retaining bolts.

Tighten: Tighten the power steering gear heat shield retaining bolts to 9 N.m (80 lb in).

3. Install the plastic clip to the power steering gear heat shield.
4. Install the stabilizer shaft links. Refer to **Stabilizer Shaft Link Replacement** .
5. Lower the vehicle.

STEERING GEAR REPLACEMENT

Tools Required

- **J 24319-B** Universal Steering Linkage Puller. See **Special Tools**.
- **J 42640** Steering Column Anti-Rotation Pin

Removal Procedure

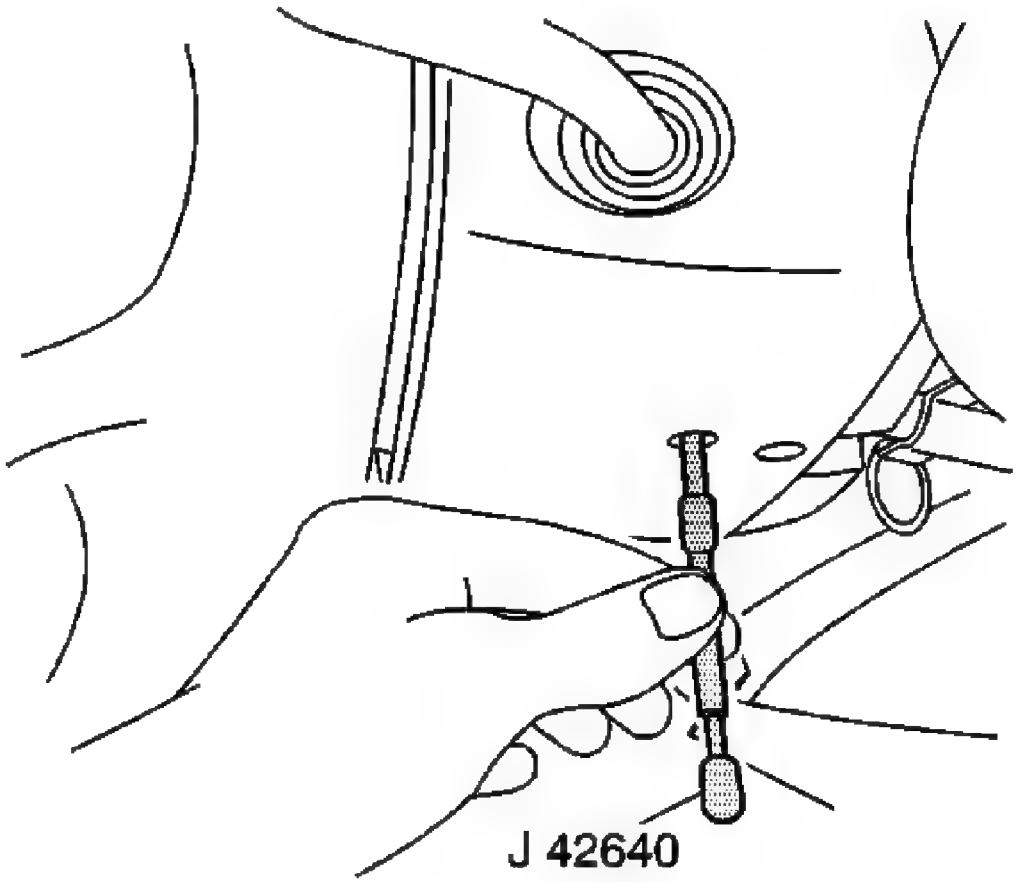


Fig. 67: Identifying J 42640
Courtesy of GENERAL MOTORS CORP.

1. Lock the steering column by installing **J 42640** into the underside of the steering column.
2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
3. Remove the tires and wheels. Refer to **Tire and Wheel Removal and Installation** .
4. Remove the power steering gear heatshield. Refer to **Steering Gear Heat Shield**

Replacement.

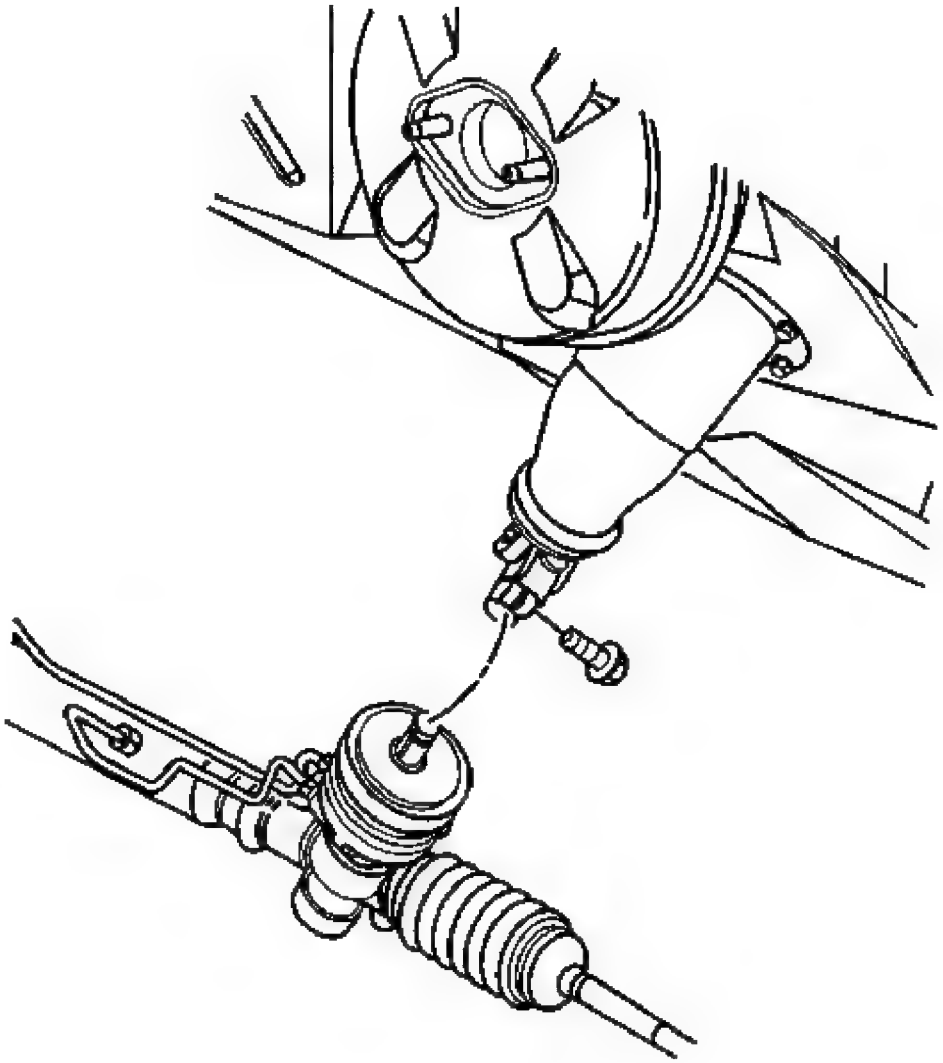


Fig. 68: Locating Steering Rack-To-Intermediate Shaft Pinch Bolt
Courtesy of GENERAL MOTORS CORP.

CAUTION: Failure to disconnect the intermediate shaft from the rack and pinion stub shaft can result in damage to the steering gear and/or intermediate shaft. This damage can cause loss of steering control which could result in personal injury.

NOTE: **The wheels of the vehicle must be straight ahead and the steering column in the LOCK position before disconnecting the steering column or intermediate shaft from the steering gear. Failure to do so will cause the coil assembly in the steering column to become uncentered which will cause damage to the coil assembly.**

5. Remove the intermediate shaft lower pinch bolt. coupling.
6. Disconnect the intermediate shaft from the power steering gear.

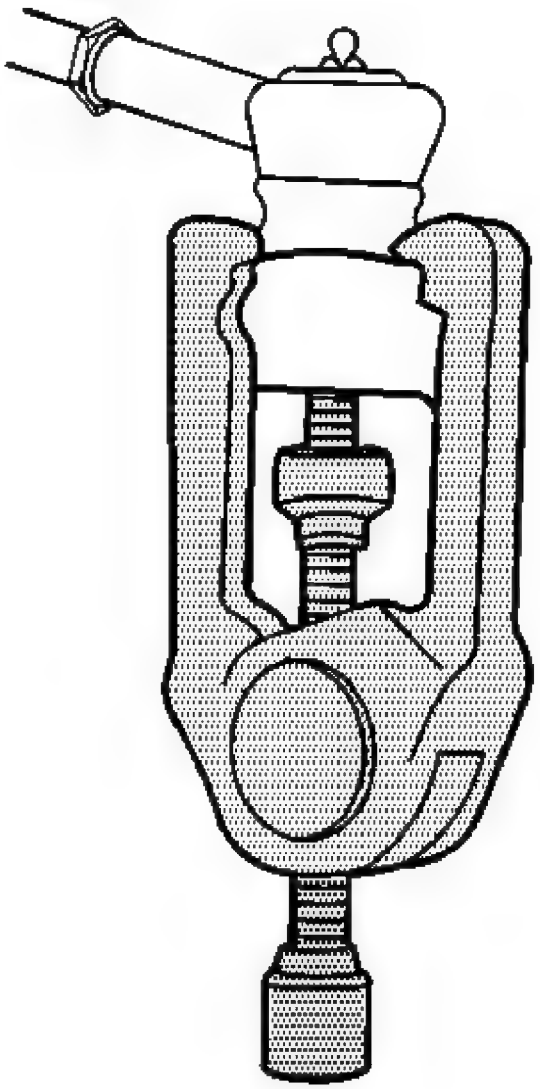


Fig. 69: Removing Outer Tie Rod Assembly From Steering Knuckle
Courtesy of GENERAL MOTORS CORP.

7. Remove the outer tie rods retaining nuts.
8. Using the **J 24319-B** separate the outer tie rods from the steering knuckles. See **Special Tools**.

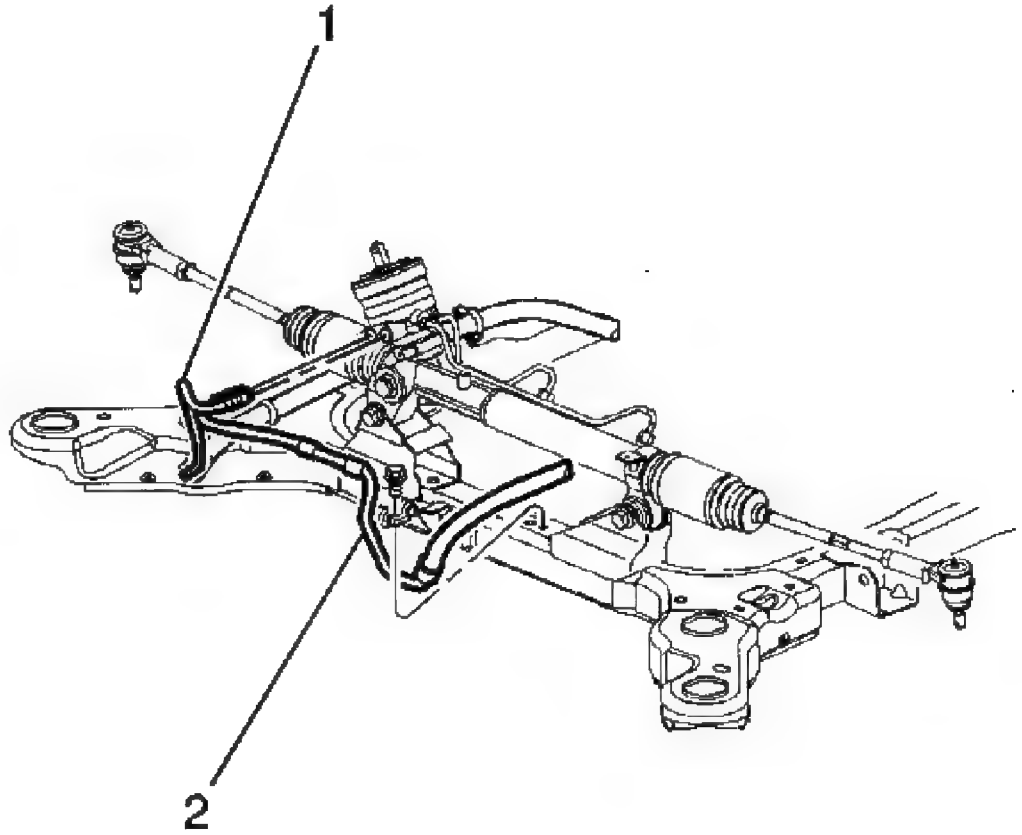


Fig. 70: View of Power Steering Pressure & Return Hoses
Courtesy of GENERAL MOTORS CORP.

9. Remove the power steering pressure and return hoses (1, 2) from the power steering gear.
10. If equipped, disconnect the variable effort steering electrical connector.
11. Remove the left stabilizer shaft insulator. Refer to **Stabilizer Shaft Insulator Replacement** .

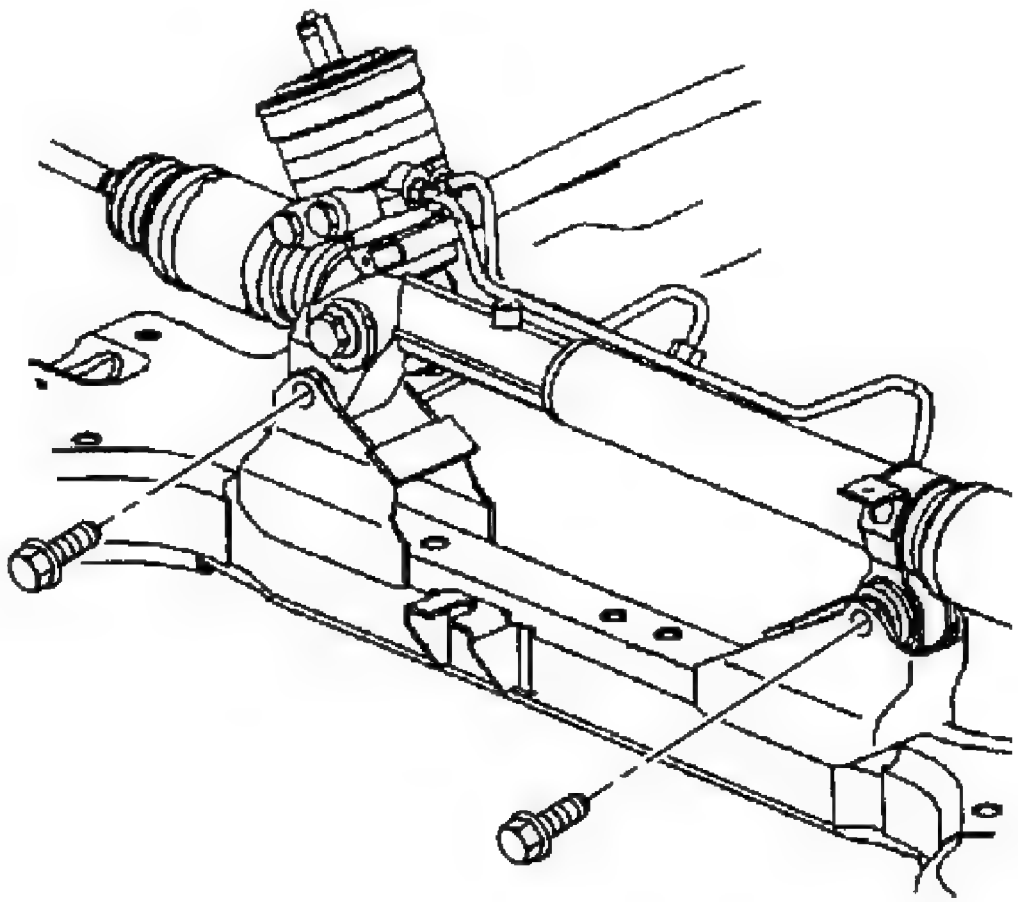


Fig. 71: View Of Steering Gear Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

12. Disconnect the tie rod ends from the knuckles.
13. Remove the power steering gear mounting bolts.
14. Remove the power steering gear through the left wheel opening.
15. Transfer the outer tie rods if replacing the power steering gear.

Installation Procedure

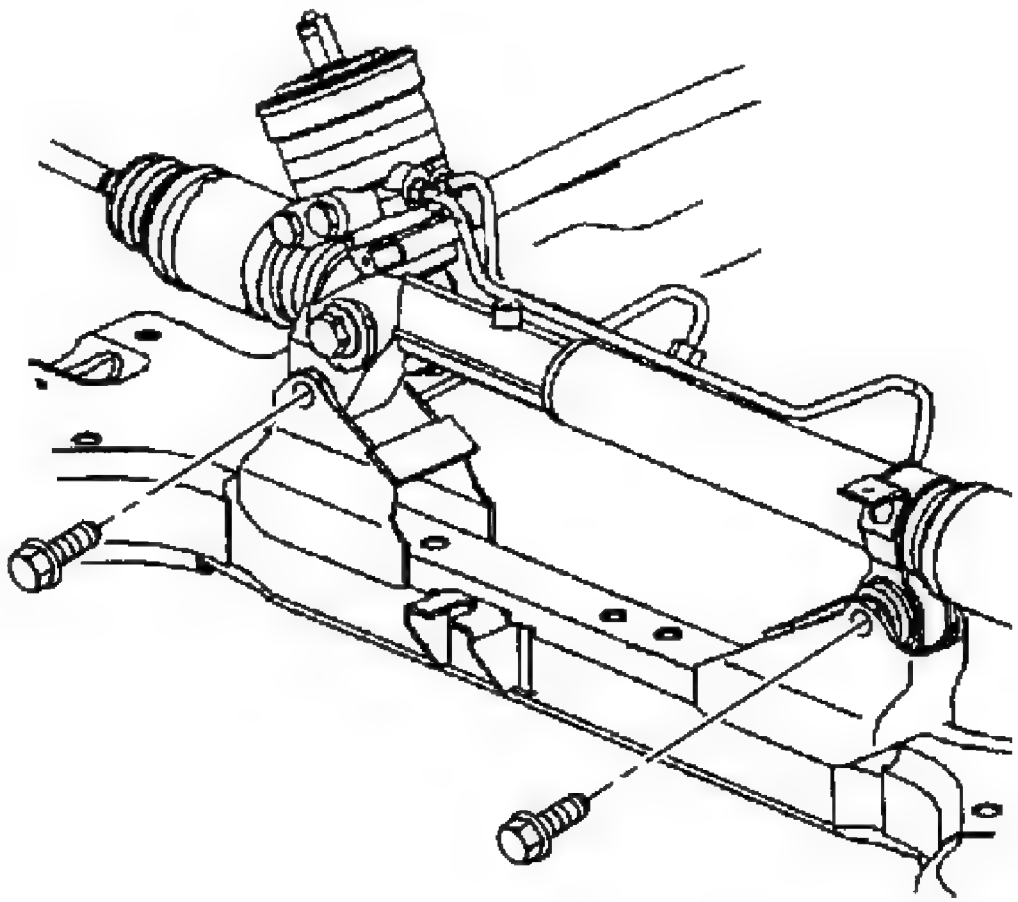


Fig. 72: View Of Steering Gear Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the power steering gear through the left wheel opening.

   NOTE: Refer to Fastener Notice .

2. Install the power steering gear mounting bolts.

   Tighten: Tighten the power steering gear mounting bolts to 95 N.m (70 lb ft).

3. Install the left stabilizer shaft insulator. Refer to **Stabilizer Shaft Insulator Replacement** .

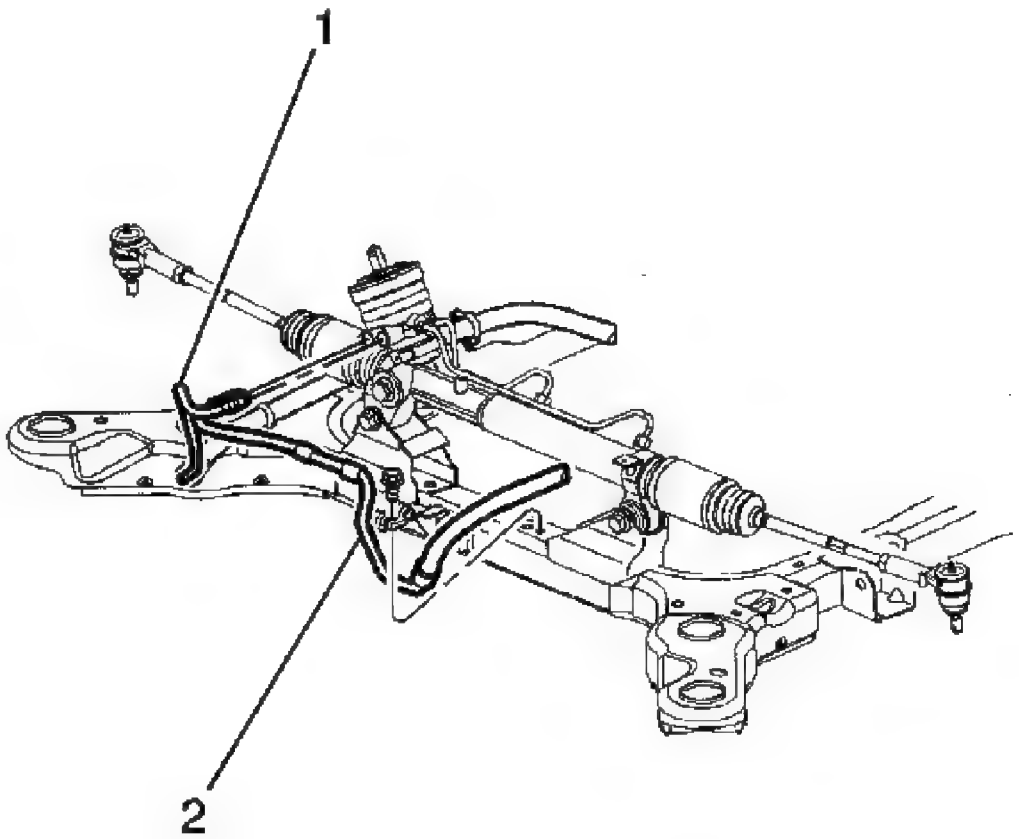


Fig. 73: View of Power Steering Pressure & Return Hoses
Courtesy of GENERAL MOTORS CORP.

4. Install the power steering pressure and return hoses (1, 2) to the power steering gear.

   Tighten: Tighten the power steering pressure and return hoses to 30 N.m (22 lb ft).

5. If equipped, connect the variable effort steering electrical connector.

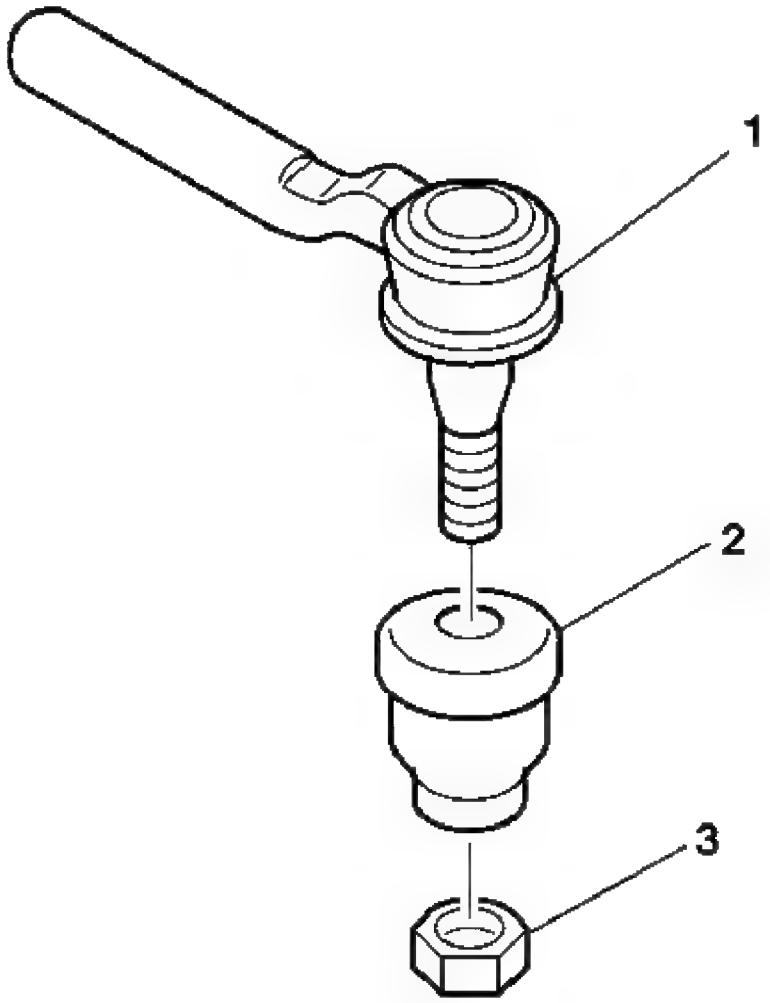


Fig. 74: Installing Tie Rod Seal To Outer Tie Rod Assembly
Courtesy of GENERAL MOTORS CORP.

6. Install the outer tie rod (1) to the steering knuckles.
7. Install the outer tie rod retaining nuts.

Tighten: Tighten the outer tie rod retaining nuts to 30 N.m (22 lb ft) plus an additional 180 degrees.

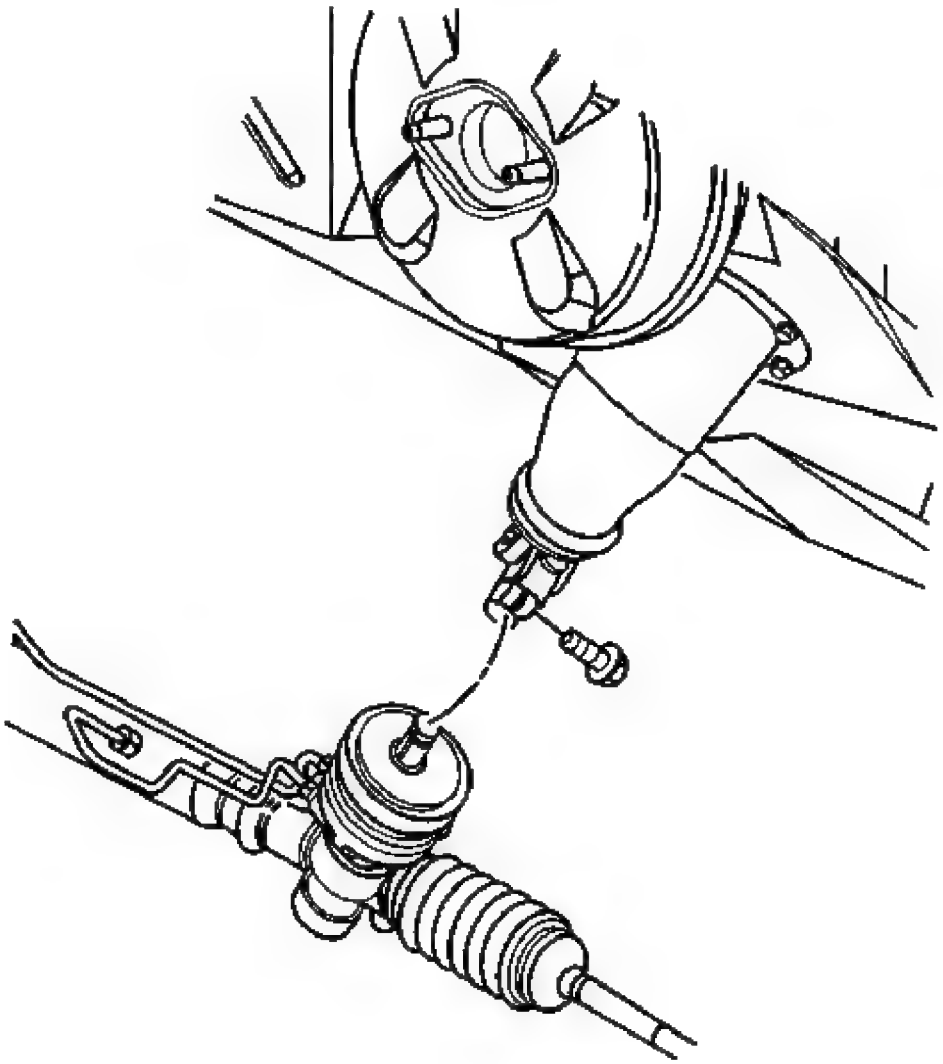


Fig. 75: Locating Steering Rack-To-Intermediate Shaft Pinch Bolt
Courtesy of GENERAL MOTORS CORP.

8. Connect the intermediate shaft to the power steering gear.
9. Install the intermediate shaft lower pinch bolt.

   Tighten: Tighten the intermediate shaft lower pinch bolt to 47 N.m (37 lb ft).

10. Install the power steering gear heatshield. Refer to **Steering Gear Heat Shield Replacement**.
11. Install the tires and wheels. Refer to **Tire and Wheel Removal and Installation** .

12. Lower the vehicle.

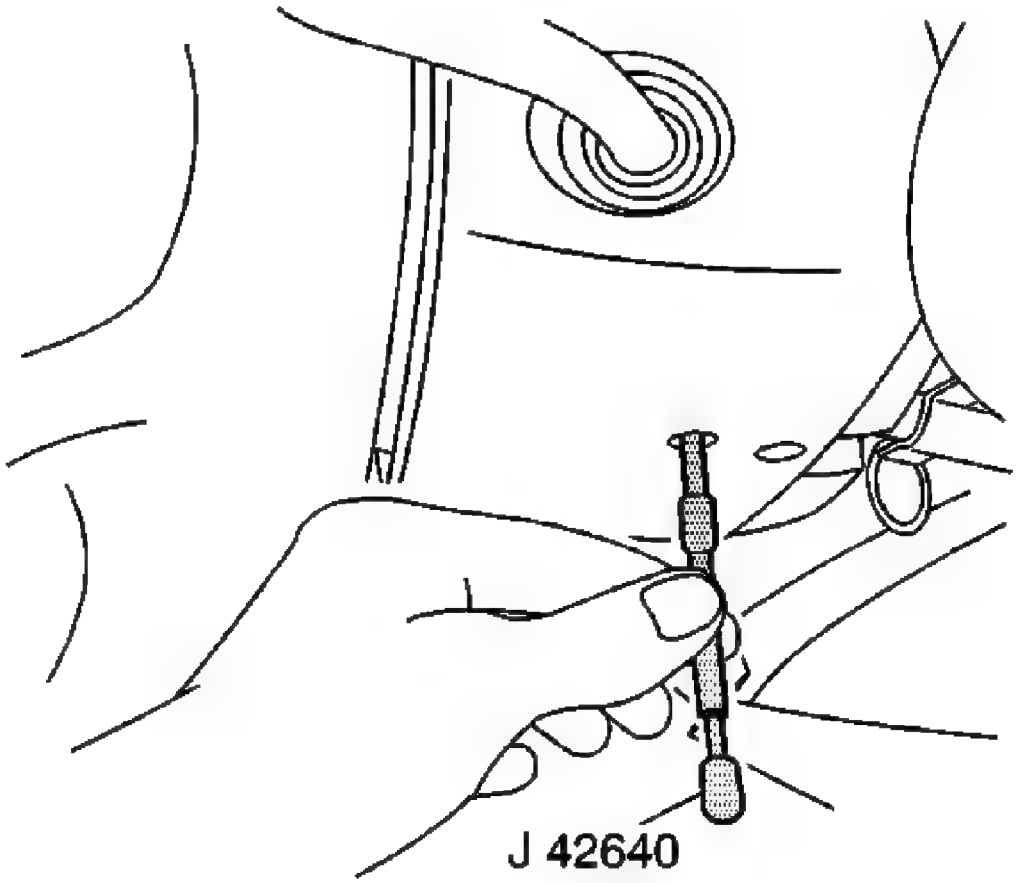


Fig. 76: Identifying J 42640
Courtesy of GENERAL MOTORS CORP.

13. Remove the **J 42640** from the steering column.
14. Bleed the power steering system. Refer to **Power Steering System Bleeding**.
15. Check the power steering system for leaks.
16. Adjust the front toe. Refer to **Front Toe Adjustment** .

STEERING GEAR RACK BEARING PRELOAD ADJUSTMENT - OFF VEHICLE (RACK AND AND PINION)

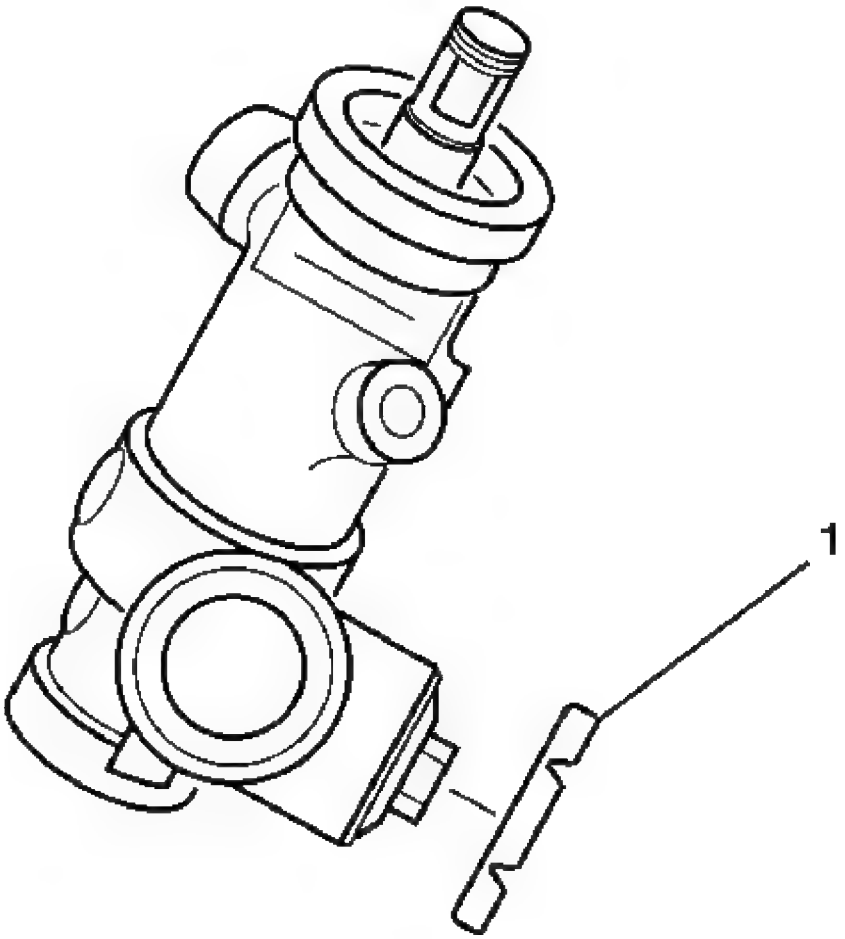


Fig. 77: View Of Adjuster Plug Lock Nut (Rack & Pinion)
Courtesy of GENERAL MOTORS CORP.

1. Loosen the adjuster plug lock nut (1).
2. Turn the adjuster plug clockwise until the adjuster plug bottoms in the gear assembly.
3. Turn the adjuster plug back 50 degrees to 70 degrees (approximately one flat).

NOTE: **Refer to Fastener Notice .**

4. Install the adjuster plug lock nut (1) to the adjuster plug.

Tighten: Hold the adjuster plug stationary while tightening the adjuster plug lock nut (1) to 68 N.m (50 lb ft).

STEERING GEAR BOOT REPLACEMENT - OFF VEHICLE

Tools Required

J 22610 Keystone Clamp Pliers. See **Special Tools**.

Disassembly Procedure

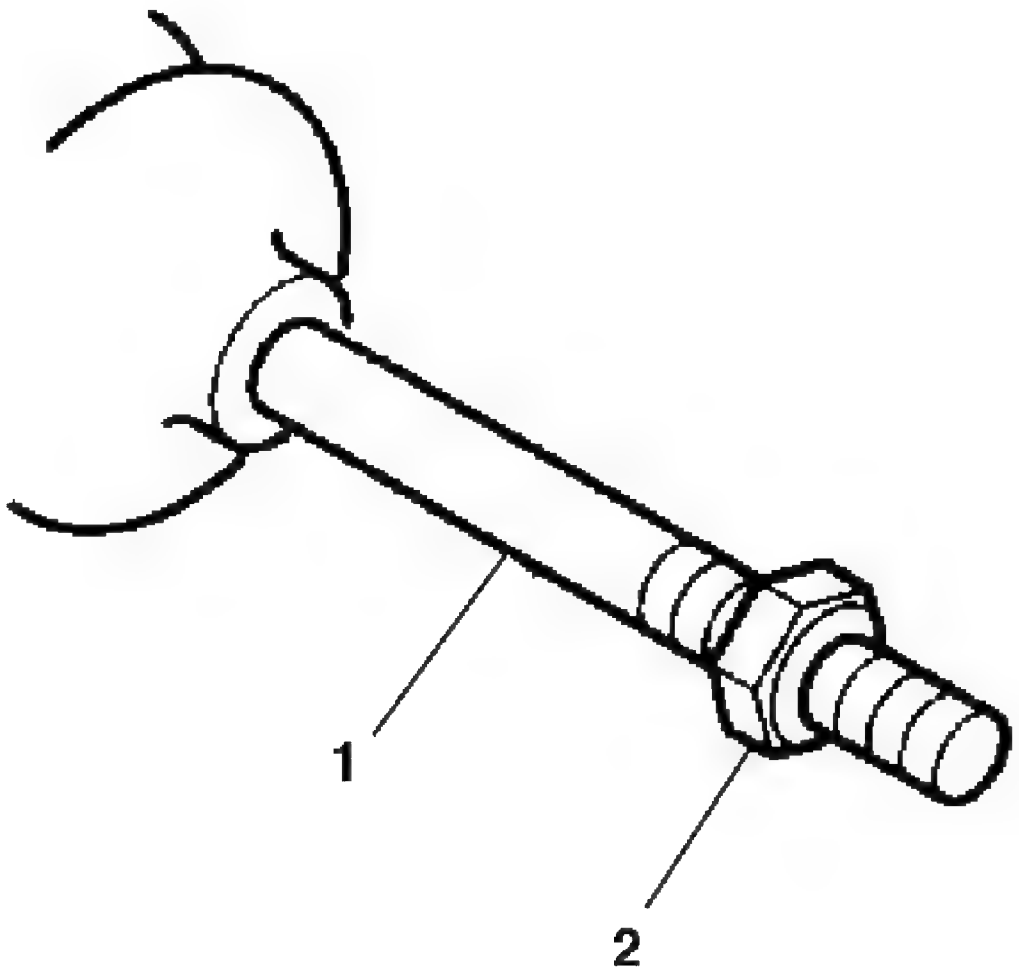


Fig. 78: Identifying Inner Tie Rod Assembly Jam Nut
Courtesy of GENERAL MOTORS CORP.

1. To remove the outer tie rod; refer to **Rack and Pinion Outer Tie Rod End Replacement**.
2. Remove the hex jam nut (2) from the inner tie rod assembly (1).

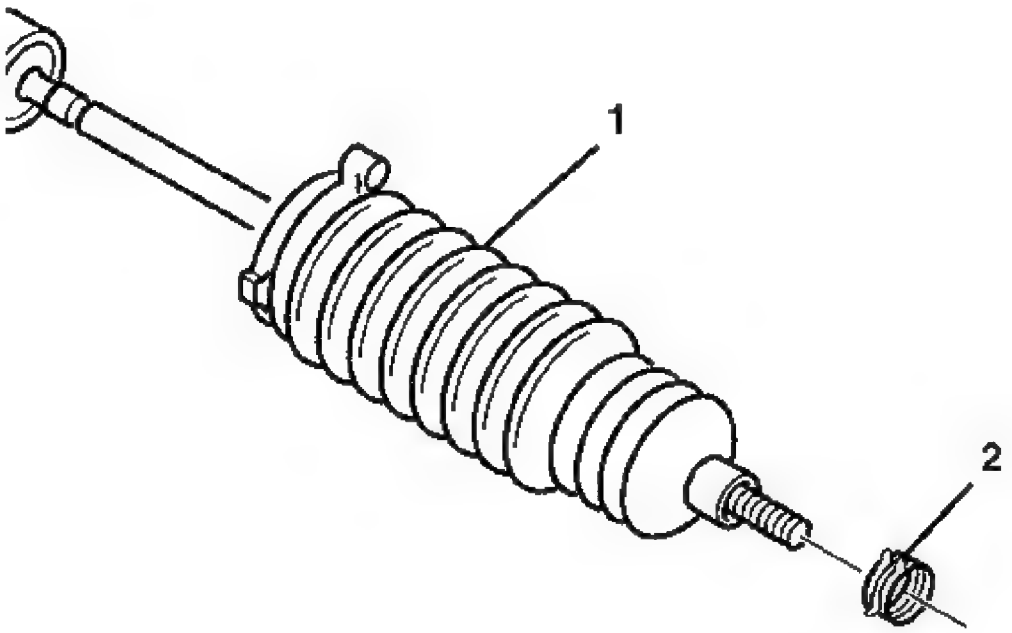


Fig. 79: View Of Tie Rod End Clamp, Rack & Pinion Boot
Courtesy of GENERAL MOTORS CORP.

3. Remove the tie rod end clamp (2) from the rack and pinion boot (1).

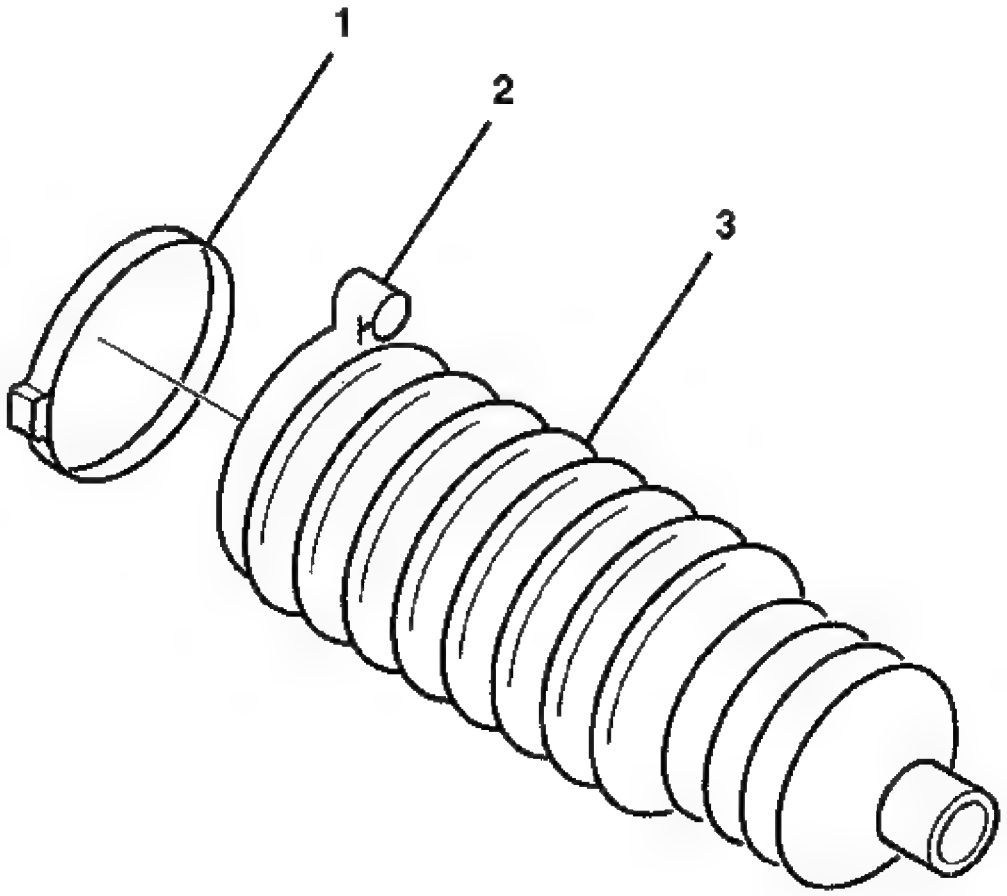


Fig. 80: View Of Inner Tie Rod Boot Clamp
Courtesy of GENERAL MOTORS CORP.

4. Remove the boot clamp (1) from the rack and pinion boot with side cutters.
5. Discard the boot clamp (1).

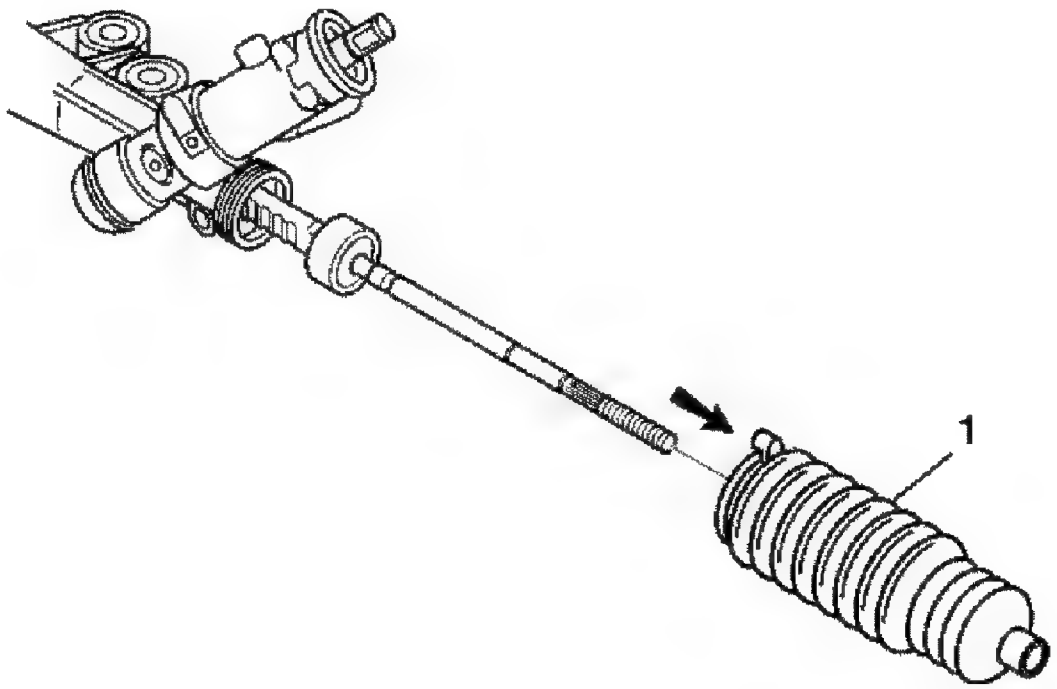


Fig. 81: Removing Rack & Pinion Boot
Courtesy of GENERAL MOTORS CORP.

6. Remove the rack and pinion boot (1) from the rack and pinion gear assembly.

Assembly Procedure

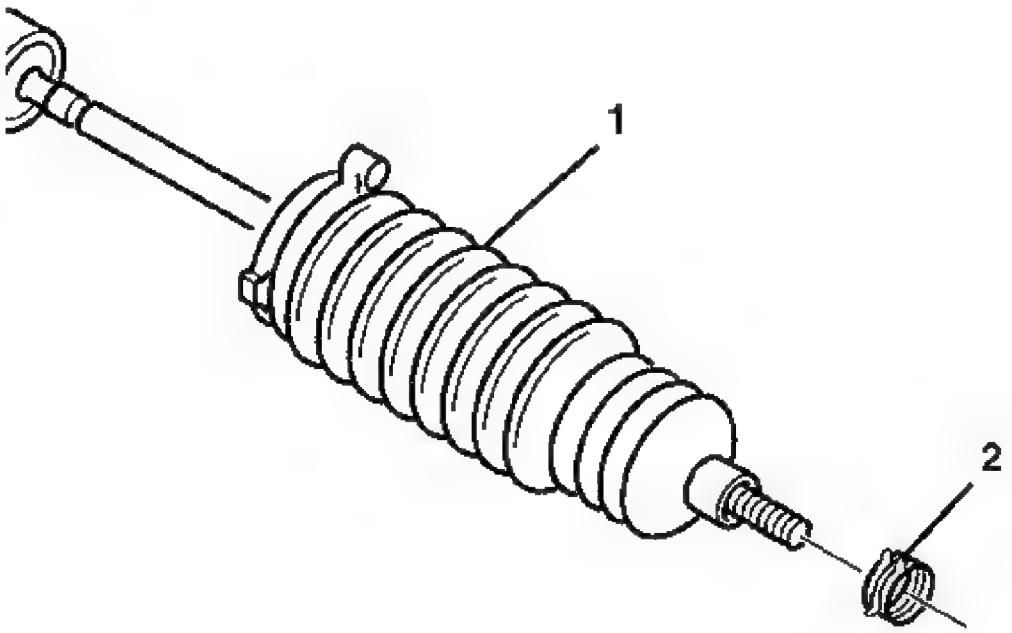


Fig. 82: View Of Tie Rod End Clamp, Rack & Pinion Boot
Courtesy of GENERAL MOTORS CORP.

1. Install the new boot clamp (2) onto the rack and pinion boot (1).

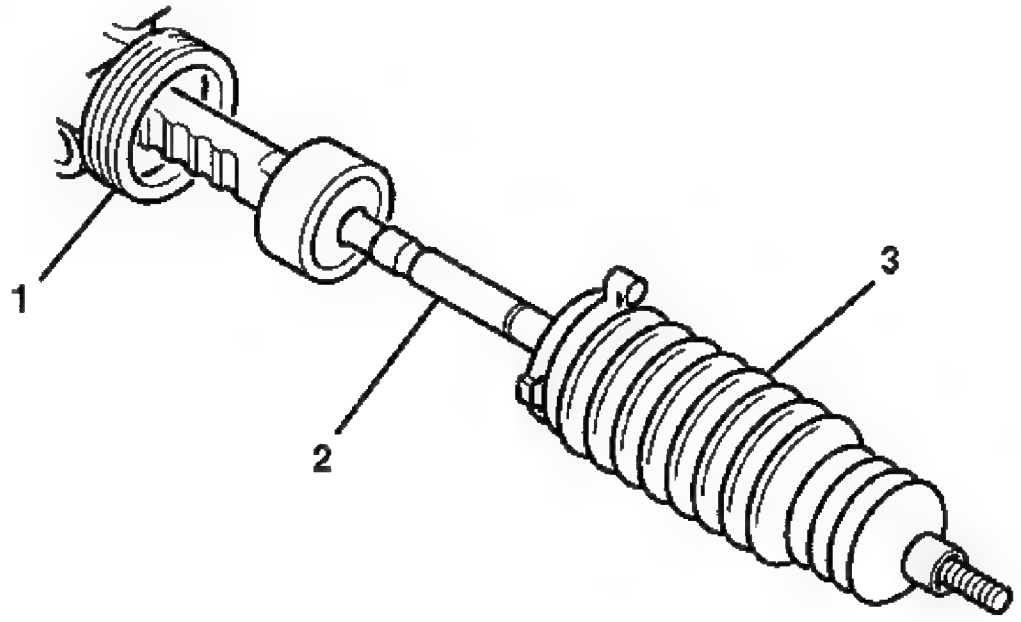


Fig. 83: Inner Tie Rod, Rack And Pinion Gear & Rack And Pinion Boot
Courtesy of GENERAL MOTORS CORP.

2. Prior to rack and pinion boot installation, apply grease to the inner tie rod assembly (2) and the rack and pinion gear assembly (1).
3. Install the rack and pinion boot (3) onto the inner tie rod assembly (2).

IMPORTANT: The rack and pinion boot (3) must not be twisted, puckered or out of shape in any way. If the rack and pinion boot (3) is not shaped properly, adjust the rack and pinion boot (3) by hand before installing the boot clamp.

4. Install the rack and pinion boot onto the gear assembly (1) until the rack and pinion boot (3) is seated in the gear assembly groove.

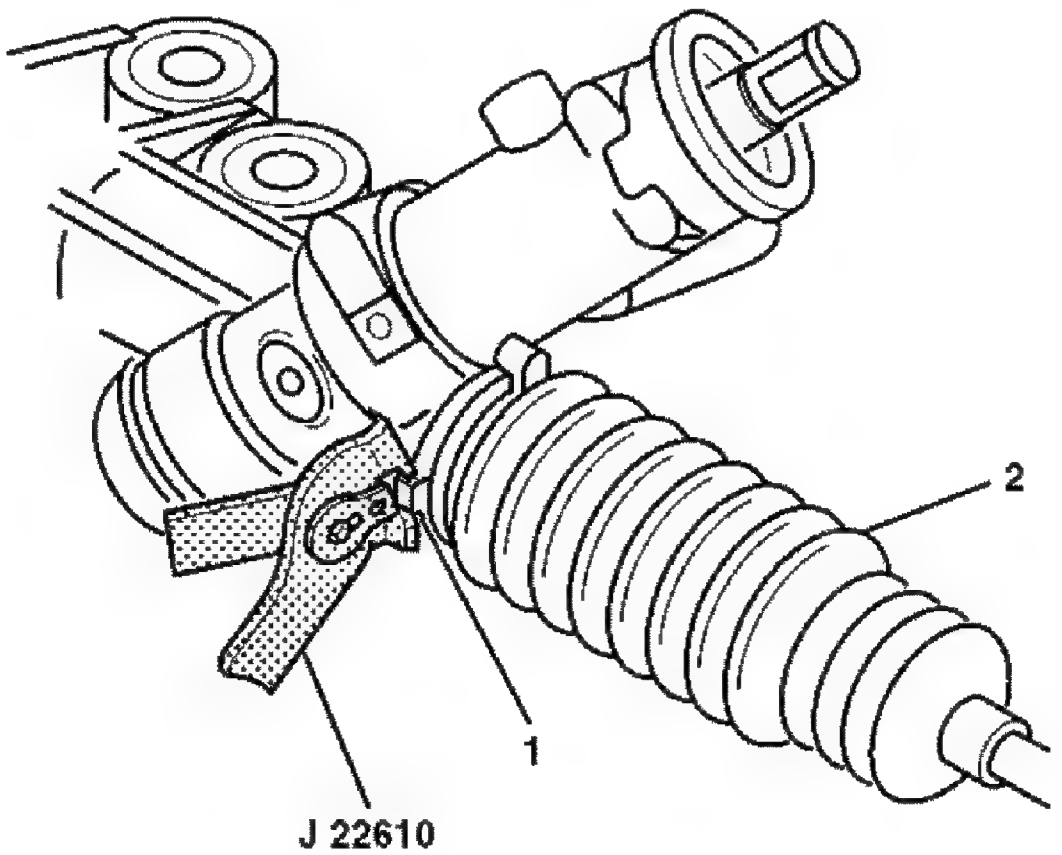


Fig. 84: Installing Inner Tie Rod Boot Clamp
Courtesy of GENERAL MOTORS CORP.

5. Install the boot clamp (1) on the rack and pinion boot (2) with **J 22610** .
6. Crimp the boot clamp (1).
7. Pinch the pliers together on the rack and pinion boot (2) in order to install the tie rod end clamp.

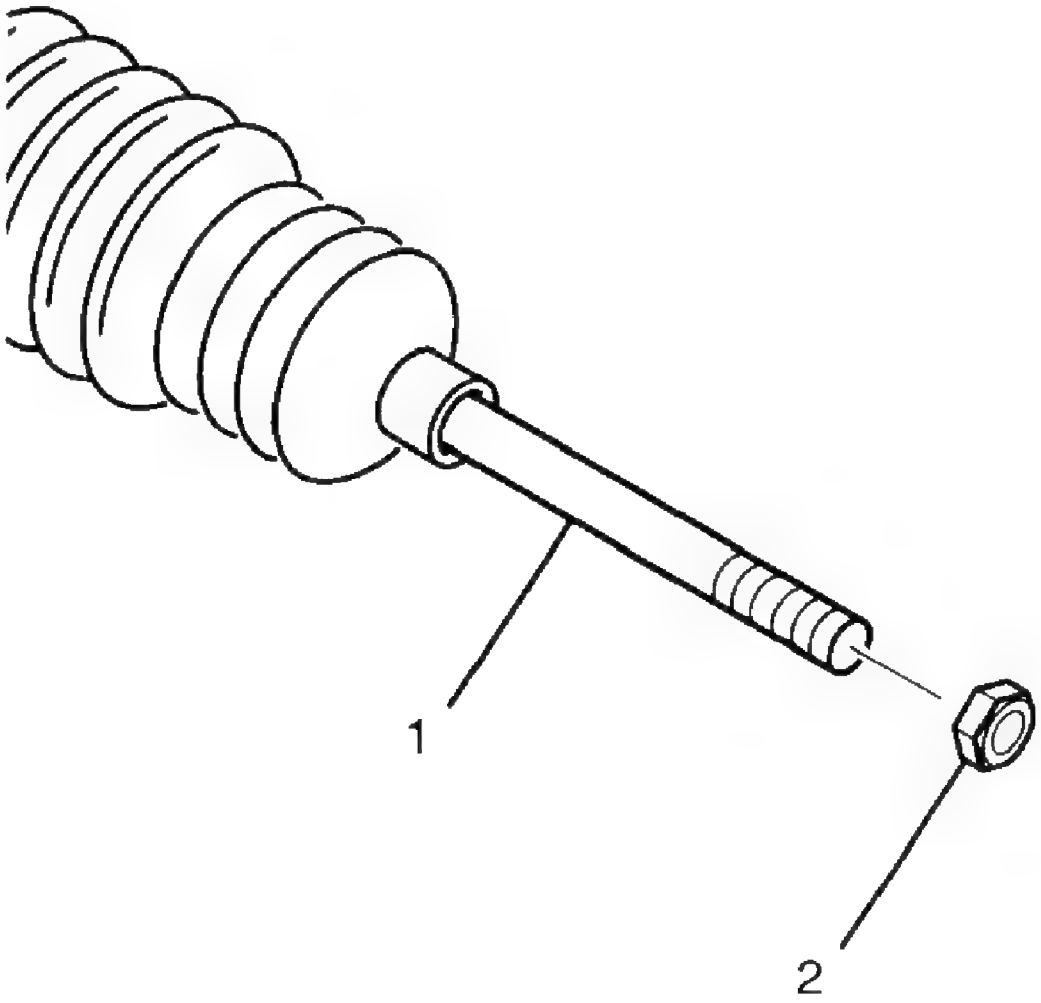


Fig. 85: View Of Inner Tie Rod & Hex Jam Nut
Courtesy of GENERAL MOTORS CORP.

8. Install the hex jam nut (2) to the inner tie rod assembly (1).
9. To assemble the outer tie rod assembly; refer to **Rack and Pinion Outer Tie Rod End Replacement**.

STEERING GEAR INNER TIE ROD REPLACEMENT - OFF VEHICLE (MAGNASTEER)

Tools Required

J 34028 Inner Tie Rod Wrench. See **Special Tools**.

Disassembly Procedure

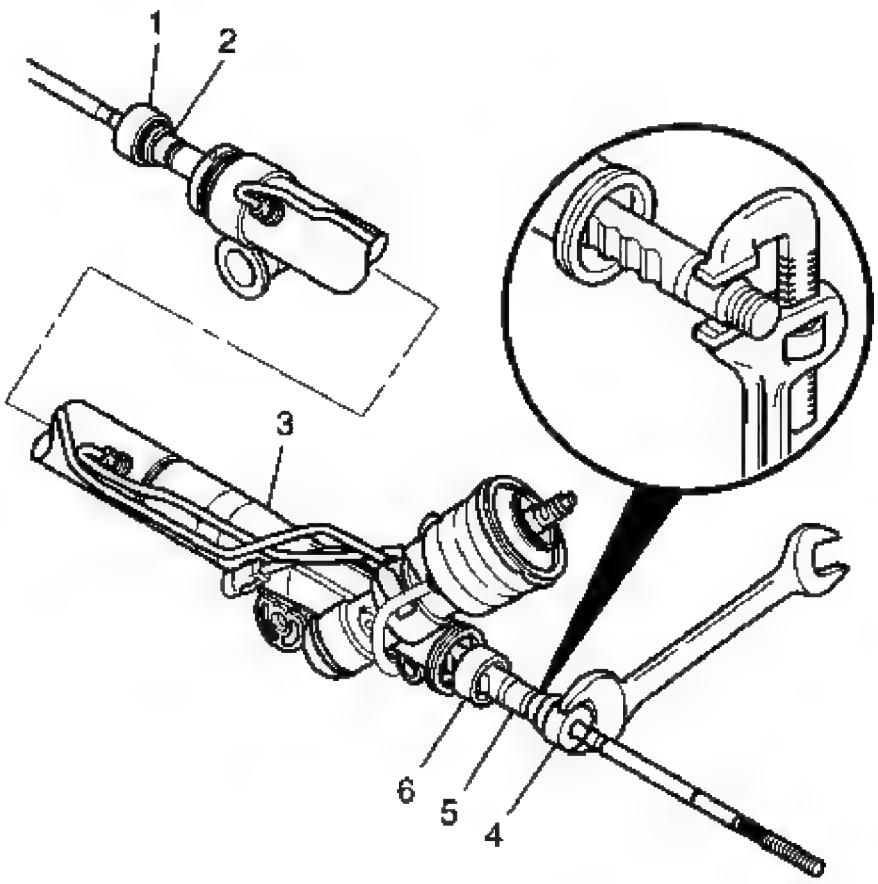


Fig. 86: View of Shock Dampener, Inner Tie Rod Housing, and Rack
Courtesy of GENERAL MOTORS CORP.

1. To remove the rack and pinion boot. Refer to **Steering Gear Boot Replacement - Off Vehicle**.
2. Place the gear in a vise.

NOTE: **Do not change the steering gear preload adjustment before moving the inner tie rod from the steering gear. Changing the steering gear preload adjustment before moving the inner tie rod could result in damage to the pinion and the steering gear.**

3. Remove the shock dampener (6) from the inner tie rod housing (4).
4. Slide the shock dampener (6) back on the rack (5).

NOTE: The pipe wrench must be placed at the valve end of the steering gear and positioned up against the inner tie rod housing. Placing the pipe wrench in any other location will cause damage to the steering gear.

5. Place a pipe wrench on the rack (5) next to the inner tie rod housing (4).
6. Place a wrench on the flats of the inner tie rod housing (4).
7. Rotate the inner tie rod housing (4) counterclockwise, while holding the rack stationary, until the inner tie rod separates from the rack (5).

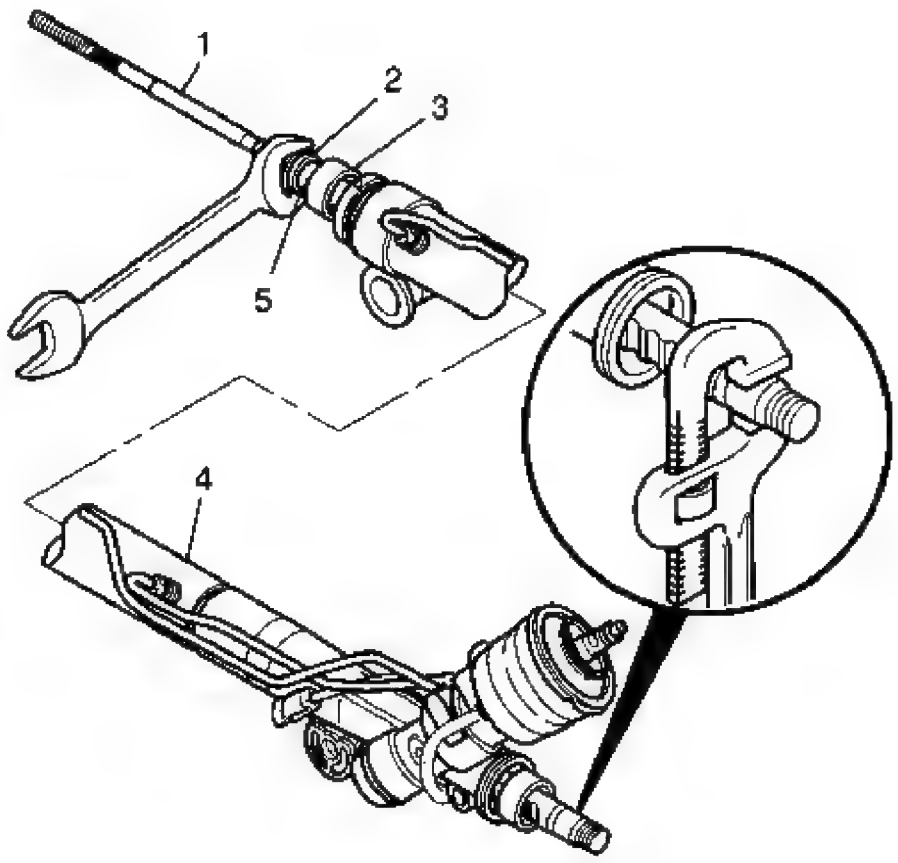


Fig. 87: View of Shock Dampener, Inner Tie Rod Housing, Rack and Inner Tie Rod
Courtesy of GENERAL MOTORS CORP.

8. Remove the shock dampener (3) from the inner tie rod housing (2).

9. Slide the shock dampener (3) back on the rack (5).

NOTE: **Refer to PIPE WRENCH POSITIONING NOTICE .**

10. Place a pipe wrench on the rack.
11. Place a wrench on the flats of the inner tie rod housing (2).
12. Rotate the inner tie rod housing (2) counterclockwise, while holding the rack stationary, until the inner tie rod (1) separates from the rack (5).

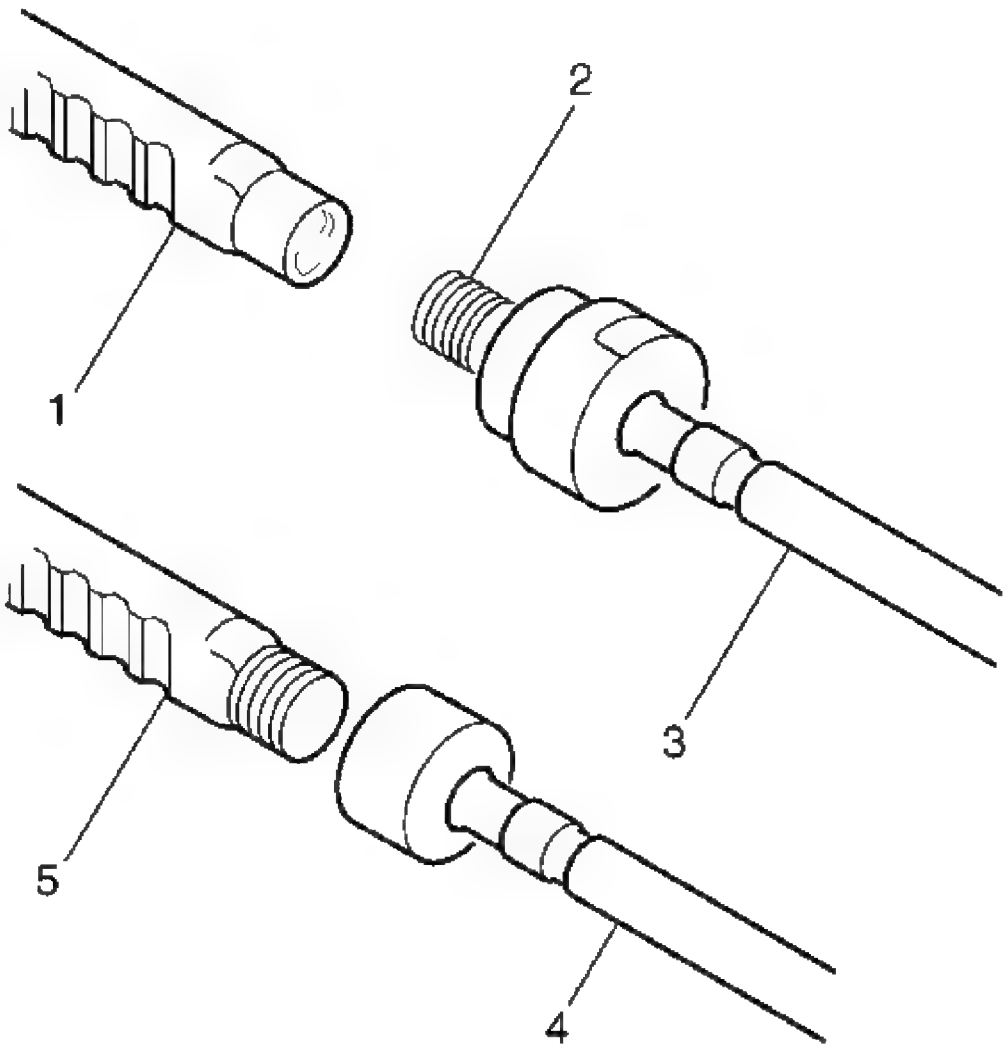


Fig. 88: Identifying Tie Rod Male & Female Ends
Courtesy of GENERAL MOTORS CORP.

13. If female rack (1) and male inner tie rod (3), remove the old LOCTITE® from the threads (2) of the inner tie rod (3) and the rack (1).

    If male rack (5) and female inner tie rod (4) LOCTITE® will not be present.

Assembly Procedure

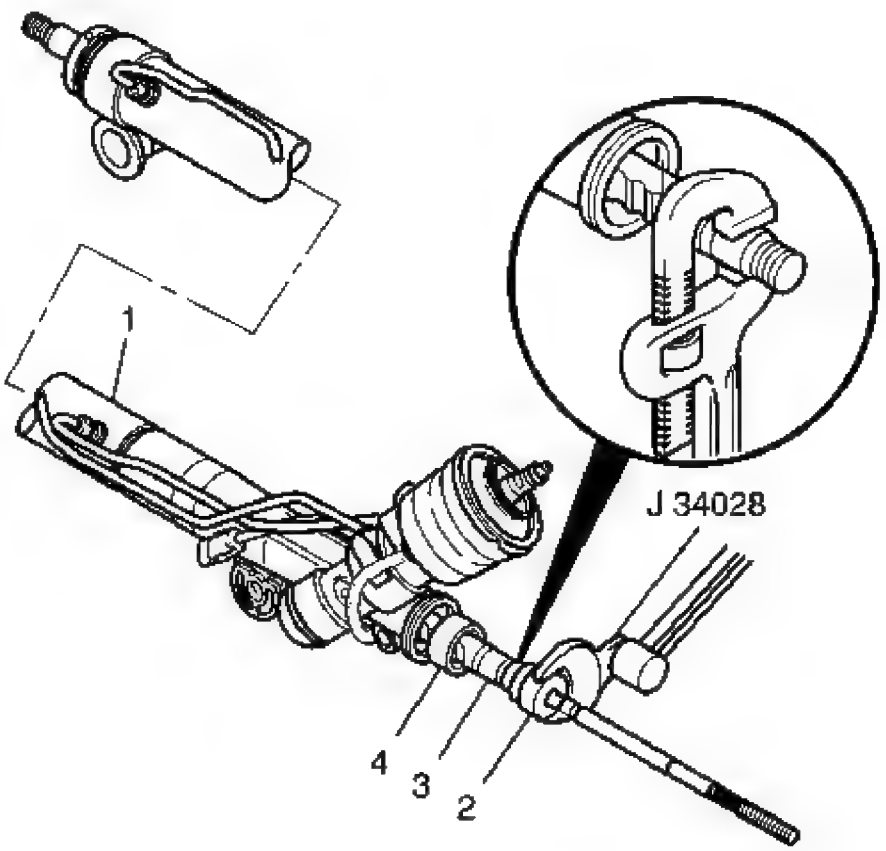


Fig. 89: View of Shock Dampener, Rack, Female/Male Inner Tie Rod with J 34028
Courtesy of GENERAL MOTORS CORP.

1. Slide the shock dampener (4) forward onto the rack (3).

IMPORTANT: Threads must be clean prior to LOCTITE® application. Check LOCTITE® or equivalent, container for expiration date. Use only enough LOCTITE® to evenly coat threads. If male rack (3) and female inner tie rod (2) do not apply

LOCTITE®.

2. If female rack (3) and male inner tie rod (2), apply LOCTITE® 262 or equivalent, to the inner tie rod threads.
3. Attach the inner tie rod onto the rack (3).

NOTE: Refer to PIPE WRENCH POSITIONING NOTICE .

4. Place a pipe wrench on the rack (3) next to the inner tie rod housing (2).

NOTE: Refer to Fastener Notice .

5. Place a torque wrench and **J 34028** on the flats of the inner tie rod housing (2). See **Special Tools**.

   Tighten: Tighten the inner tie rod to 100 N.m (74 lb ft).

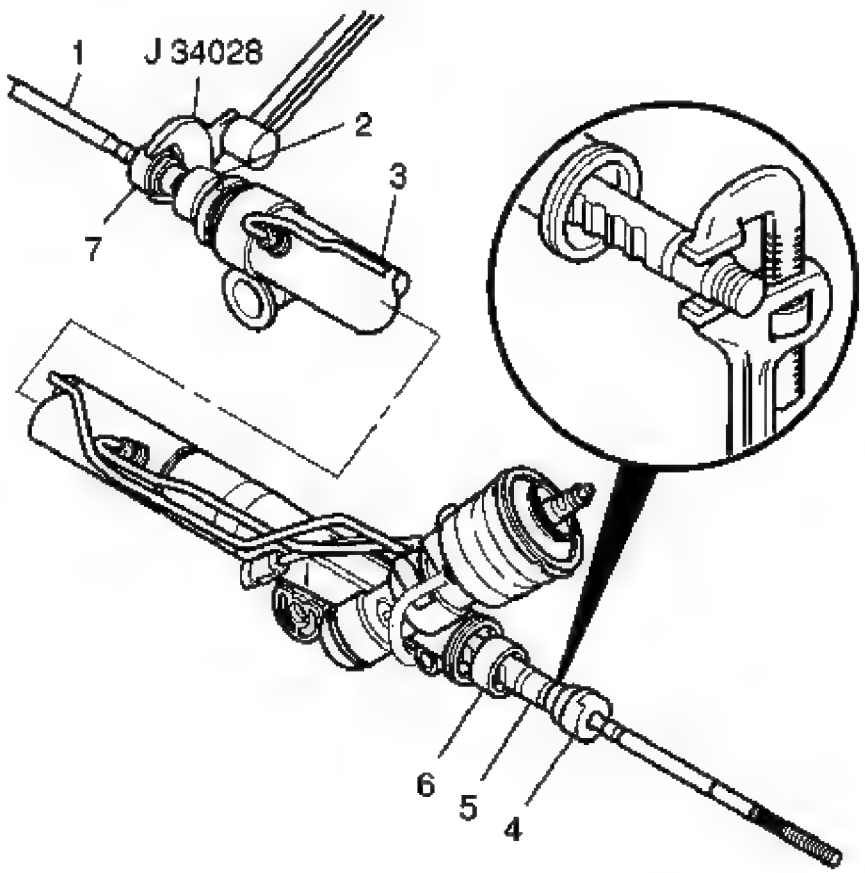


Fig. 90: View of Shock Dampener, Female/Male Inner Tie Rod and Inner Tie Rod Housing with J 34028
Courtesy of GENERAL MOTORS CORP.

6. Slide the shock dampener (2) forward onto the rack.

IMPORTANT: Threads must be clean prior to LOCTITE® application. Check LOCTITE® or equivalent, container for expiration date. Use only enough LOCTITE® to evenly coat threads. If male rack and female inner tie rod (1) do not apply LOCTITE®.

7. If female rack and male inner tie rod (1), apply LOCTITE® 262 or equivalent, to the inner tie rod threads.
8. Attach the inner tie rod (1) onto the rack.

NOTE: **Refer to PIPE WRENCH POSITIONING NOTICE .**

9. Place a pipe wrench on the rack next to the inner tie rod housing (4).
10. Place a torque wrench and **J 34028** on the flats of the inner tie rod housing (7). See **Special Tools**.

Tighten: Tighten the inner tie rod to 100 N.m (74 lb ft).

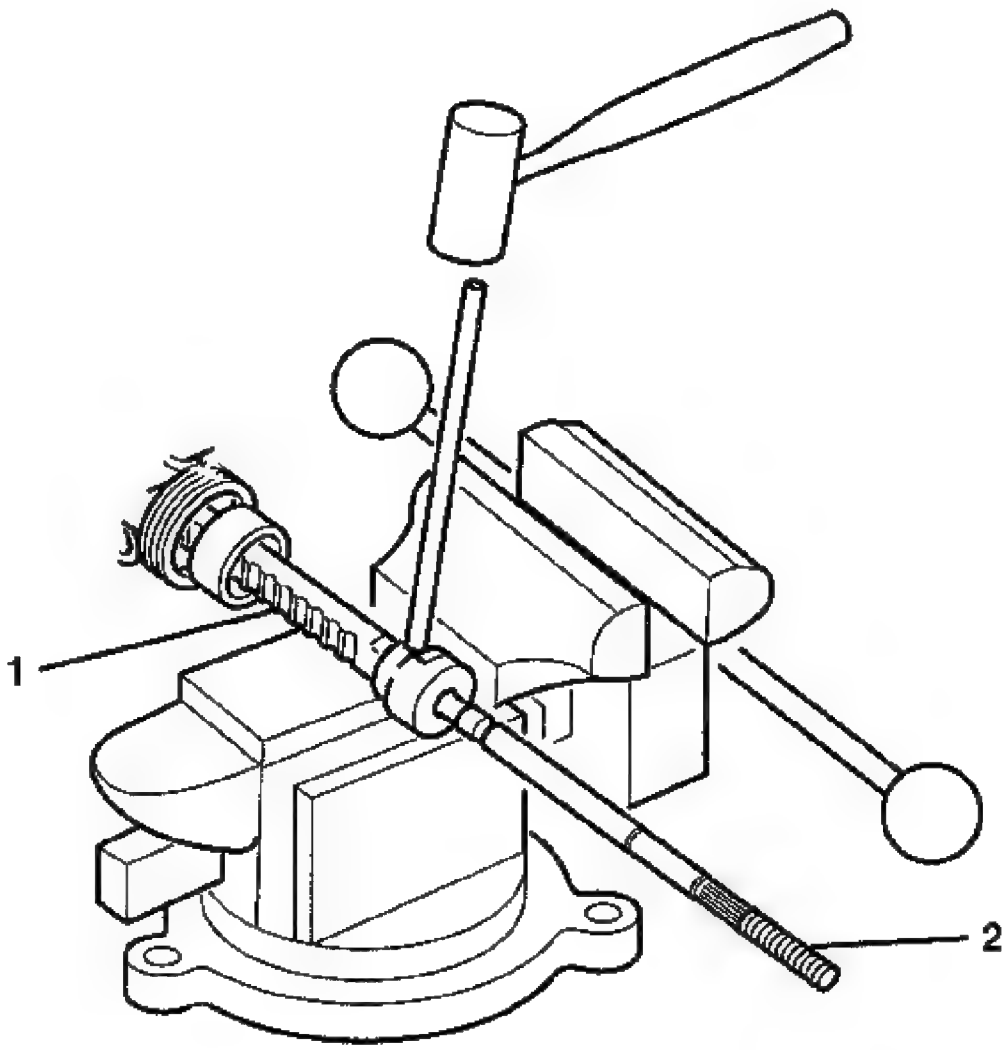


Fig. 91: Staking Both Sides Of Female Inner Tie Rod Assembly Housing To The Male Rack
Courtesy of GENERAL MOTORS CORP.

11. Place the inner tie rod assembly (2) in a vise.

IMPORTANT: If female rack (1) and male inner tie rod (2) do not stake. If male rack (1) and female inner tie rod (2) you must stake.

12. Stake both sides of the female inner tie rod assembly housing to the male rack (1).

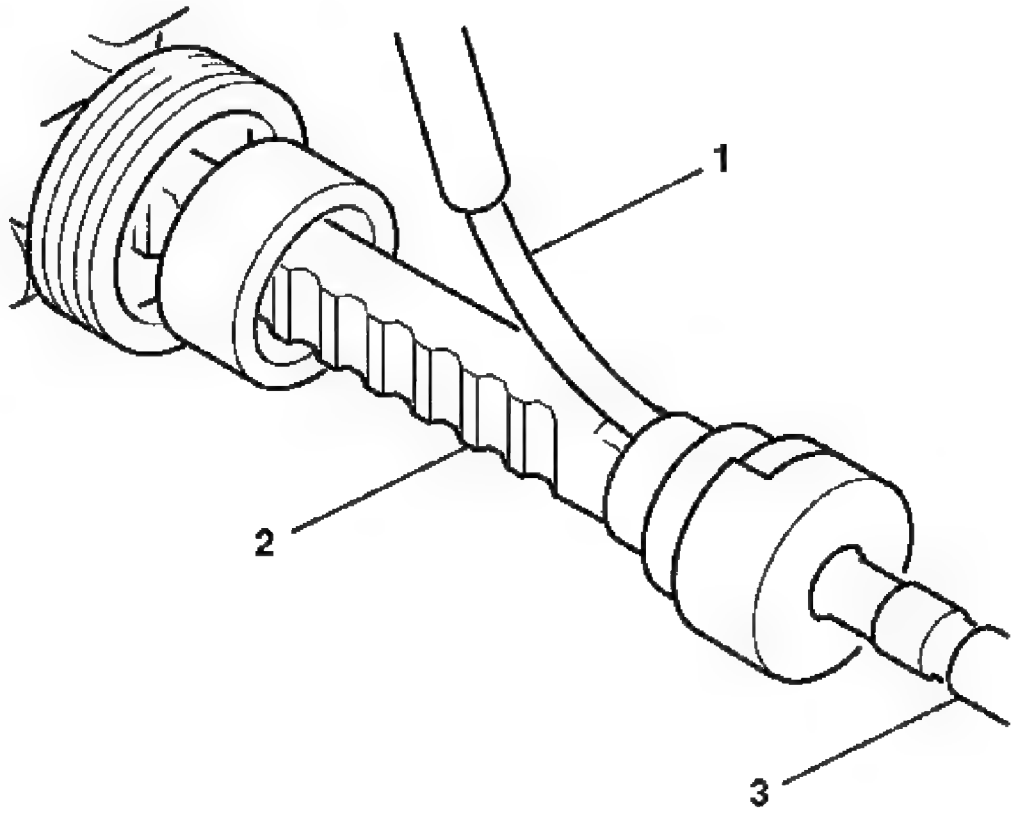


Fig. 92: Inserting Gage Between Rack & Inner Tie Rod Housing
Courtesy of GENERAL MOTORS CORP.

13. Insert a 0.25 mm gage (1) between the rack (2) and the inner tie rod housing in order to check both stakes. The feeler gage (1) must not pass between the rack and the housing stake.

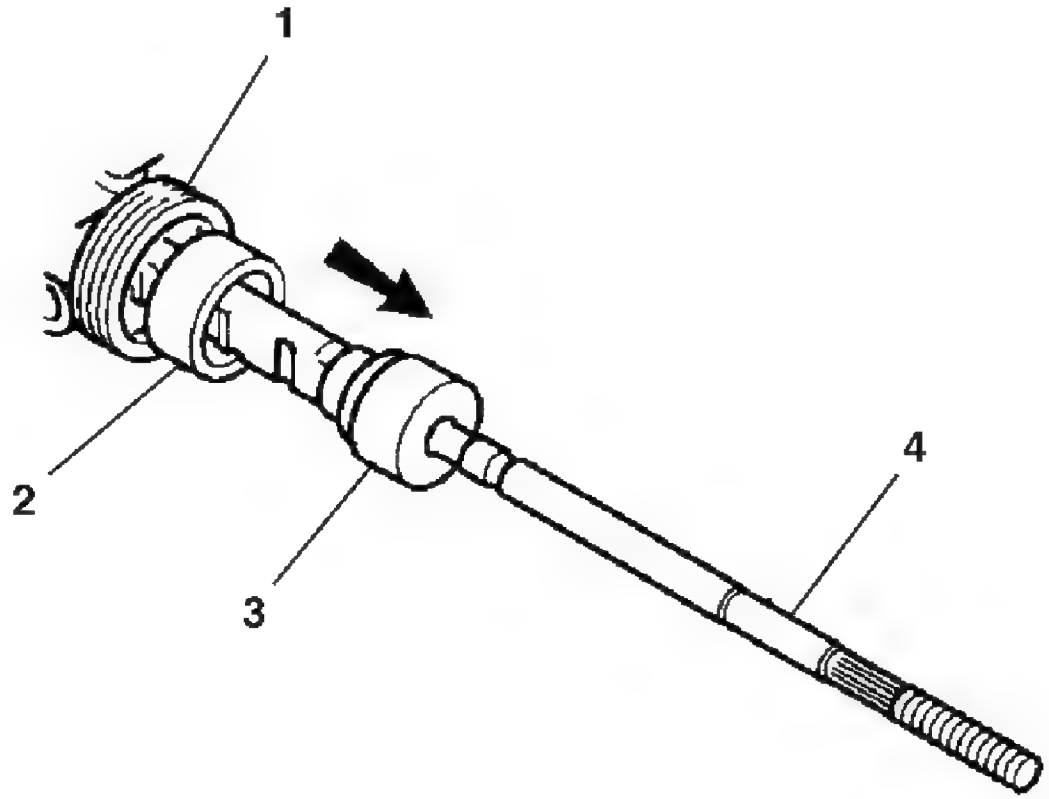


Fig. 93: Identifying Shock Dampener & Inner Tie Rod Housing
Courtesy of GENERAL MOTORS CORP.

14. Slide the shock dampener (2) over the inner tie rod housing (3) until the front lip of the shock dampener (2) bottoms against the inner tie rod housing (3).
15. To assemble the rack and pinion boot. Refer to **Steering Gear Boot Replacement - Off Vehicle**.

STEERING GEAR INNER TIE ROD REPLACEMENT - OFF VEHICLE (QUIET VALVE)

Tools Required

J 34028 Inner Tie Rod Wrench. See **Special Tools**.

Disassembly Procedure

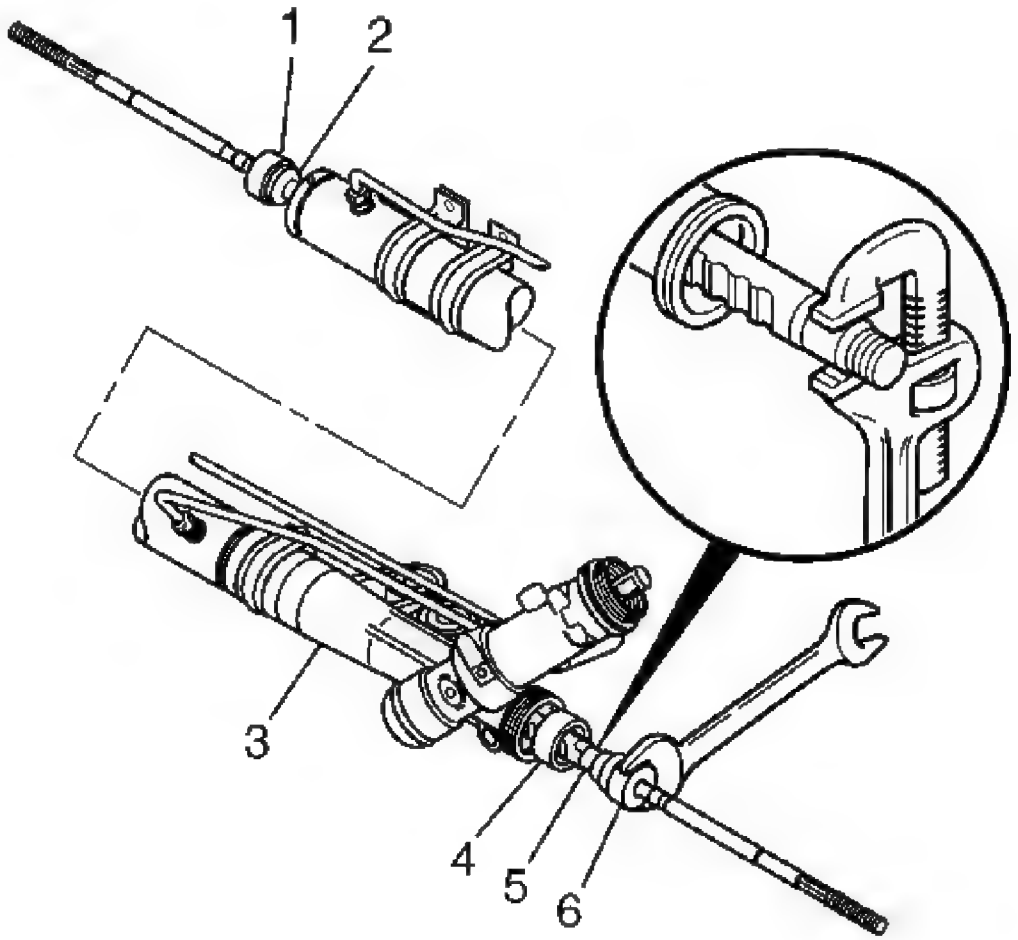


Fig. 94: Identifying Inner Tie Rod Components
Courtesy of GENERAL MOTORS CORP.

1. Remove the rack and pinion boot. Refer to **Steering Gear Boot Replacement - Off Vehicle**.
2. Place the gear in a vise.

NOTE: **Do not change the steering gear preload adjustment before moving the inner tie rod from the steering gear. Changing the steering gear preload adjustment before moving the inner tie rod could result in damage to the pinion and the steering gear.**

3. Remove the shock dampener (4) from the inner tie rod assembly (6).

4. Slide the shock dampener (4) back on the rack (5).

NOTE: **Refer to PIPE WRENCH POSITIONING NOTICE .**

5. Place a pipe wrench on the rack (5) next to the inner tie rod housing (6).
6. Place a wrench on the flats of the inner tie rod housing (6).
7. Rotate the inner tie rod housing (6) counterclockwise, while holding the rack stationary, until the inner tie rod separates from the rack (5).

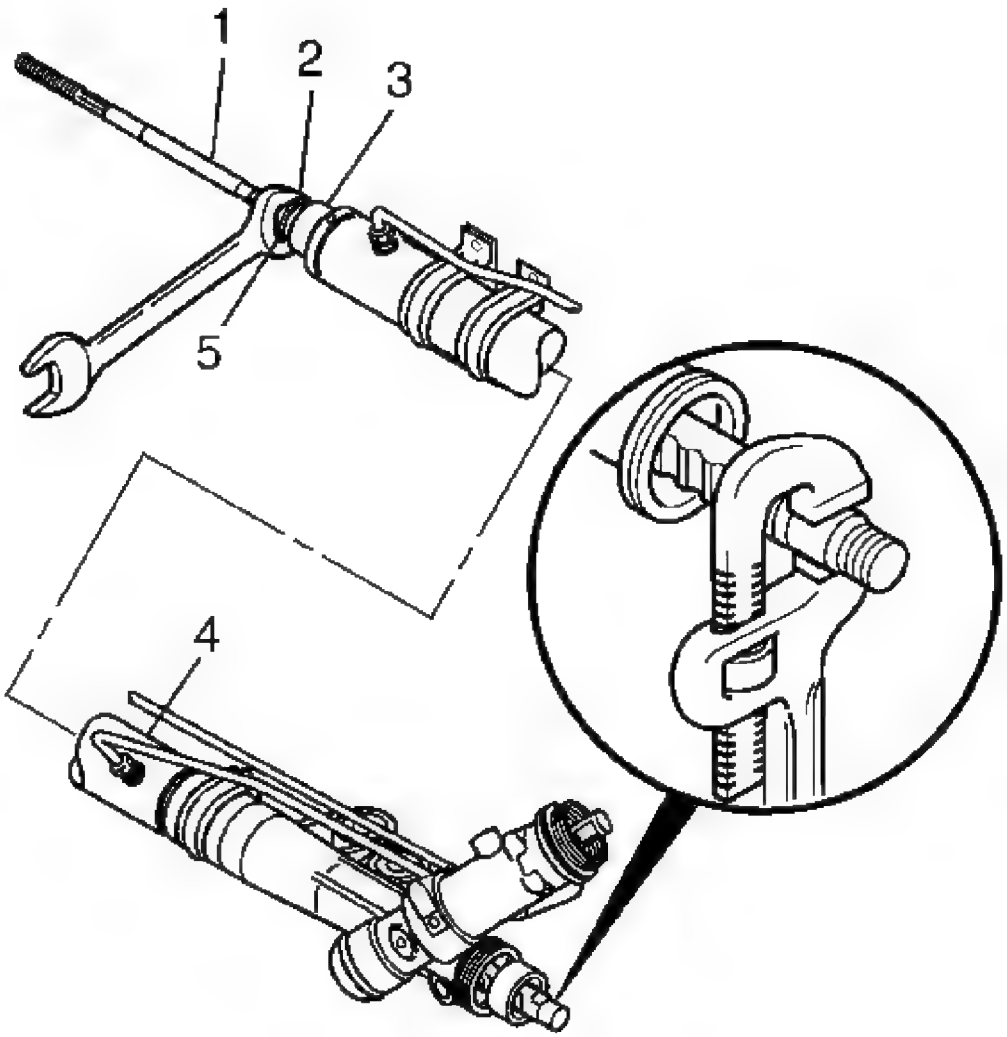


Fig. 95: Separating Inner Tie Rod From Rack
Courtesy of GENERAL MOTORS CORP.

NOTE: **Do not change the steering gear preload adjustment before moving the inner tie rod from the steering gear. Changing the steering gear preload adjustment before moving the inner tie rod could result in damage to the pinion and the steering gear.**

8. Remove the shock dampener (3) from the inner tie rod housing (2).
9. Slide the shock dampener (3) back on the rack (5).

NOTE: **Refer to PIPE WRENCH POSITIONING NOTICE .**

10. Place a pipe wrench on the rack.
11. Place a wrench on the flats of the inner tie rod housing (2).
12. Rotate the inner tie rod housing (2) counterclockwise, while holding the rack stationary, until the inner tie rod (1) separates from the rack (5).

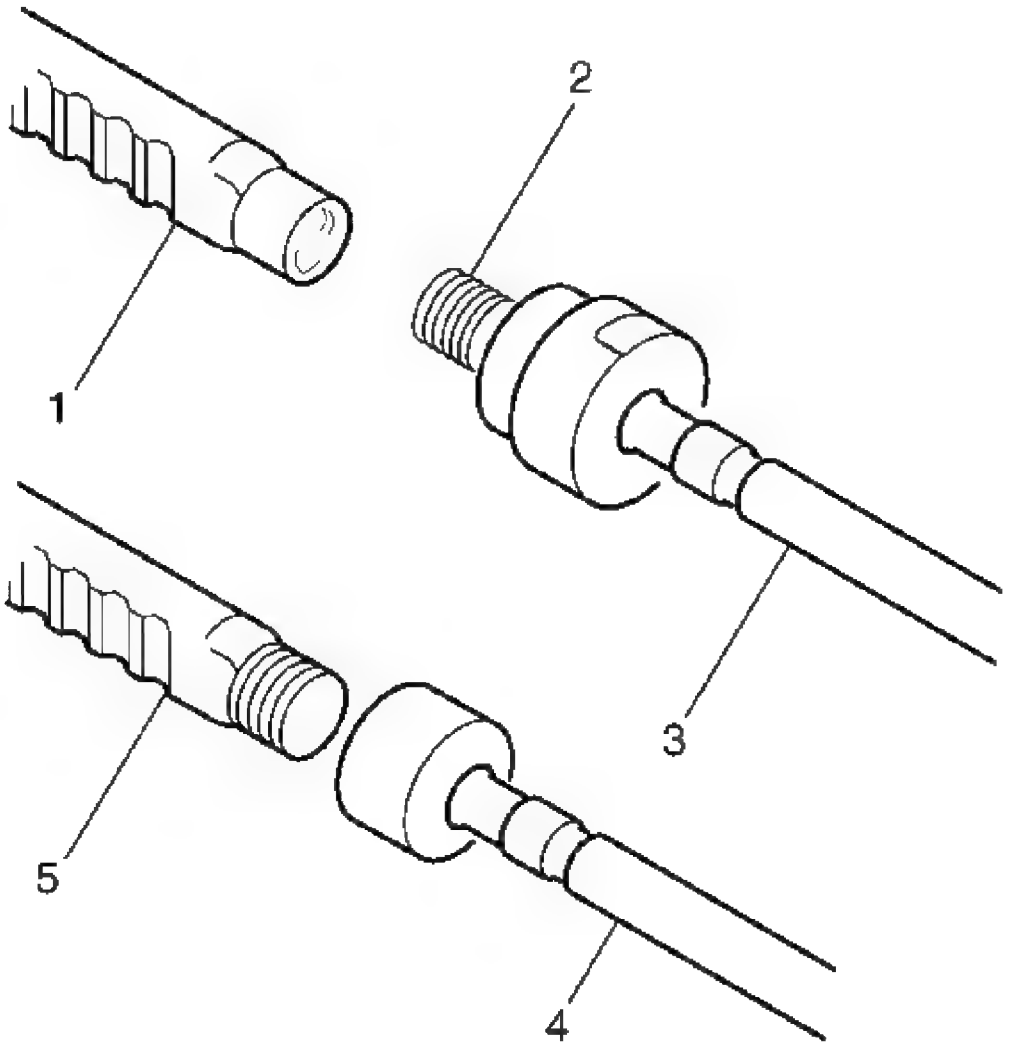


Fig. 96: Identifying Tie Rod Male & Female Ends
Courtesy of GENERAL MOTORS CORP.

13. If female rack (1) and male inner tie rod (3), remove the old LOCTITE® from the threads (2) of the inner tie rod and the rack.

    If male rack (5) and female inner tie rod (4) LOCTITE® will not be present.

Assembly Procedure

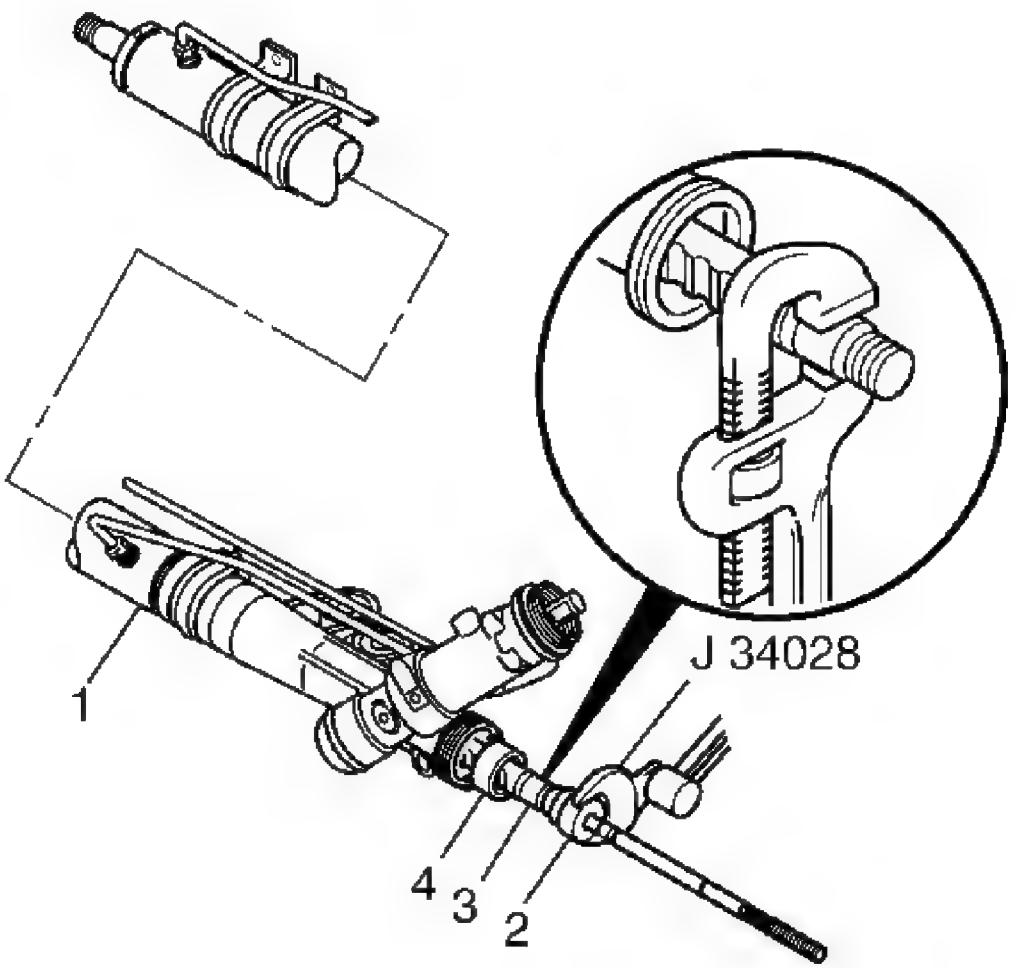


Fig. 97: Connecting Inner Tie Rod To Rack
Courtesy of GENERAL MOTORS CORP.

1. Slide the shock dampener (4) forward onto the rack (3).

IMPORTANT: Threads must be clean prior to LOCTITE® application. Check LOCTITE® or equivalent container for expiration date. Use only enough LOCTITE® to evenly coat threads. If male rack (3) and female inner tie rod (2) do not apply LOCTITE®.

2. If female rack (3) and male inner tie rod (2), apply LOCTITE® 262 or equivalent to the inner tie rod threads.
3. Attach the inner tie rod onto the rack (3).

NOTE: **Refer to PIPE WRENCH POSITIONING NOTICE .**

4. Place a pipe wrench on the rack (3) next to the inner tie rod housing (2).

NOTE: **Refer to Fastener Notice .**

5. Place a torque wrench and **J 34028** on the flats of the inner tie rod housing (2). See **Special Tools**.

Tighten: Tighten the inner tie rod to 100 N.m (74 lb ft).

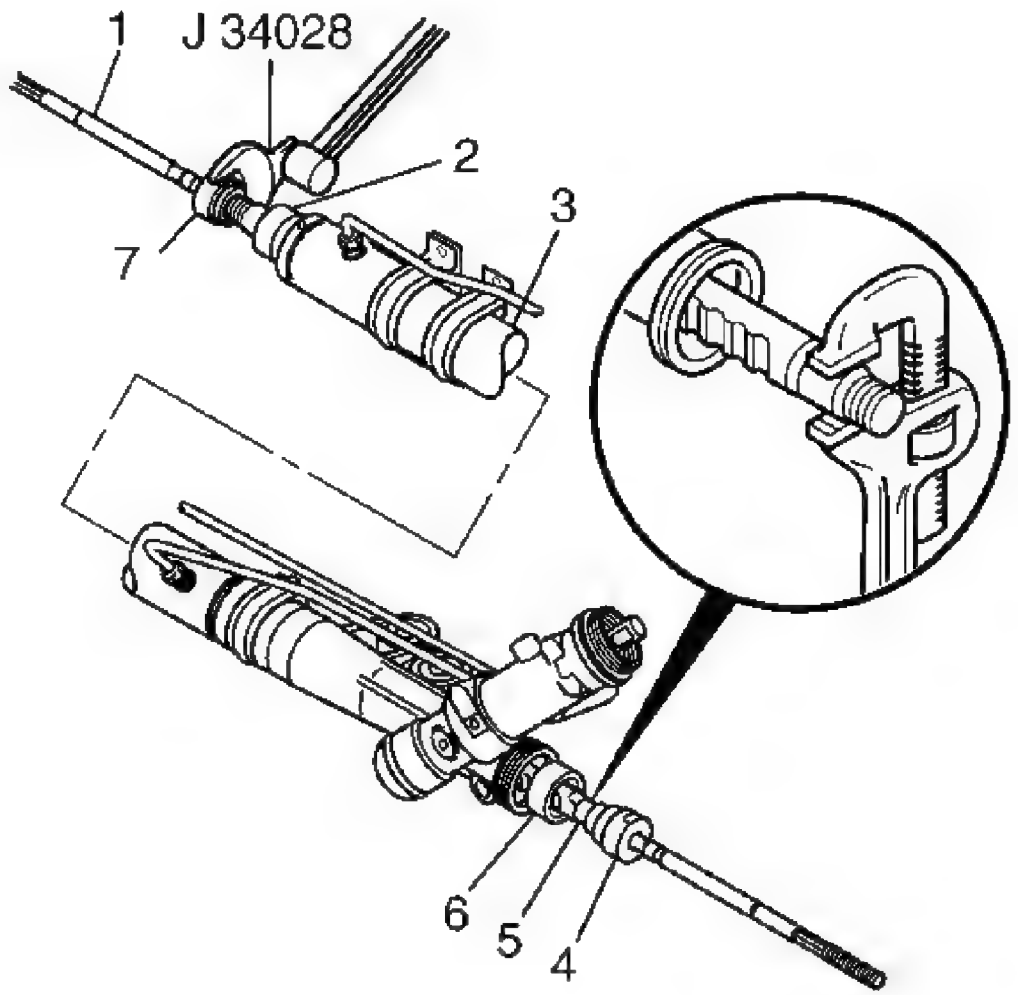


Fig. 98: Tighten The Inner Tie Rod To Rack
Courtesy of GENERAL MOTORS CORP.

6. Slide the shock dampener (2) forward onto the rack.

IMPORTANT: Threads must be clean prior to LOCTITE® application. Check LOCTITE® or equivalent container for expiration date. Use only enough LOCTITE® to evenly coat threads. If male rack and female inner tie rod (1) do not apply LOCTITE®.

7. If female rack and male inner tie rod (1), apply LOCTITE® 262 or equivalent to the inner tie rod threads.
8. Attach the inner tie rod (1) onto the rack.

NOTE: Refer to PIPE WRENCH POSITIONING NOTICE .

9. Place a pipe wrench on the rack next to the inner tie rod housing (4).
10. Place a torque wrench and **J 34028** on the flats of the inner tie rod housing (7). See **Special Tools**.

Tighten: Tighten the inner tie rod to 100 N.m (74 lb ft).

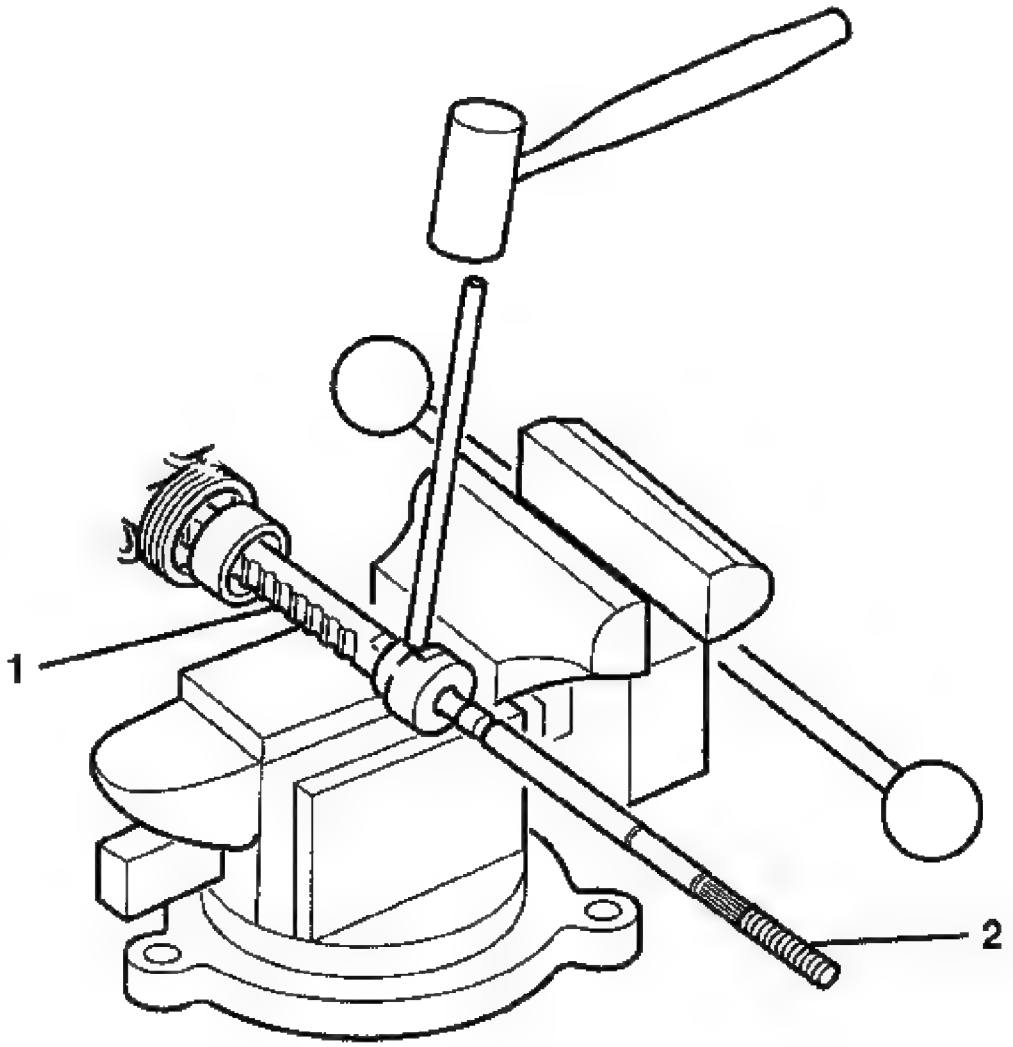


Fig. 99: Staking Both Sides Of Female Inner Tie Rod Assembly Housing To The Male Rack
Courtesy of GENERAL MOTORS CORP.

11. Place the inner tie rod assembly (2) in a vise.

IMPORTANT: If female rack (1) and male inner tie rod (2) do not stake. If male rack (1) and female inner tie rod (2) you must stake.

12. Stake both sides of the female inner tie rod assembly housing to the male rack.

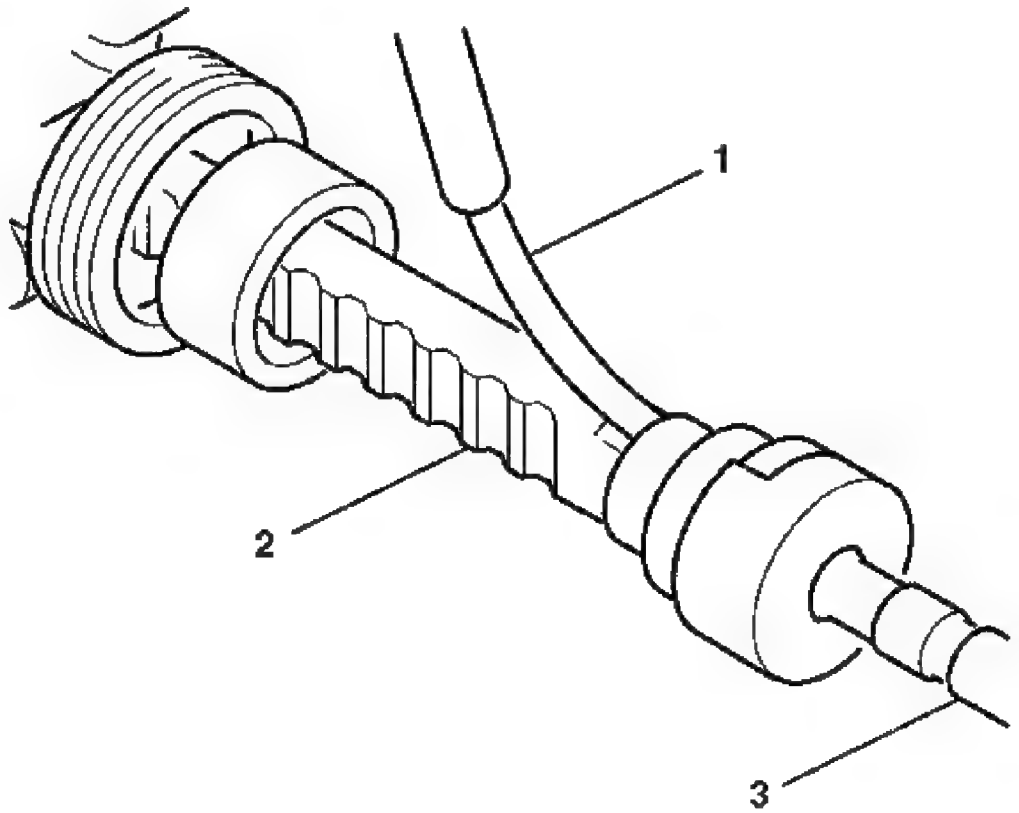


Fig. 100: Inserting Gage Between Rack & Inner Tie Rod Housing
Courtesy of GENERAL MOTORS CORP.

13. Insert a 0.25 mm gage (1) between the rack (2) and the inner tie rod housing in order to check both stakes. The feeler gage (1) must not pass between the rack and the housing stake.

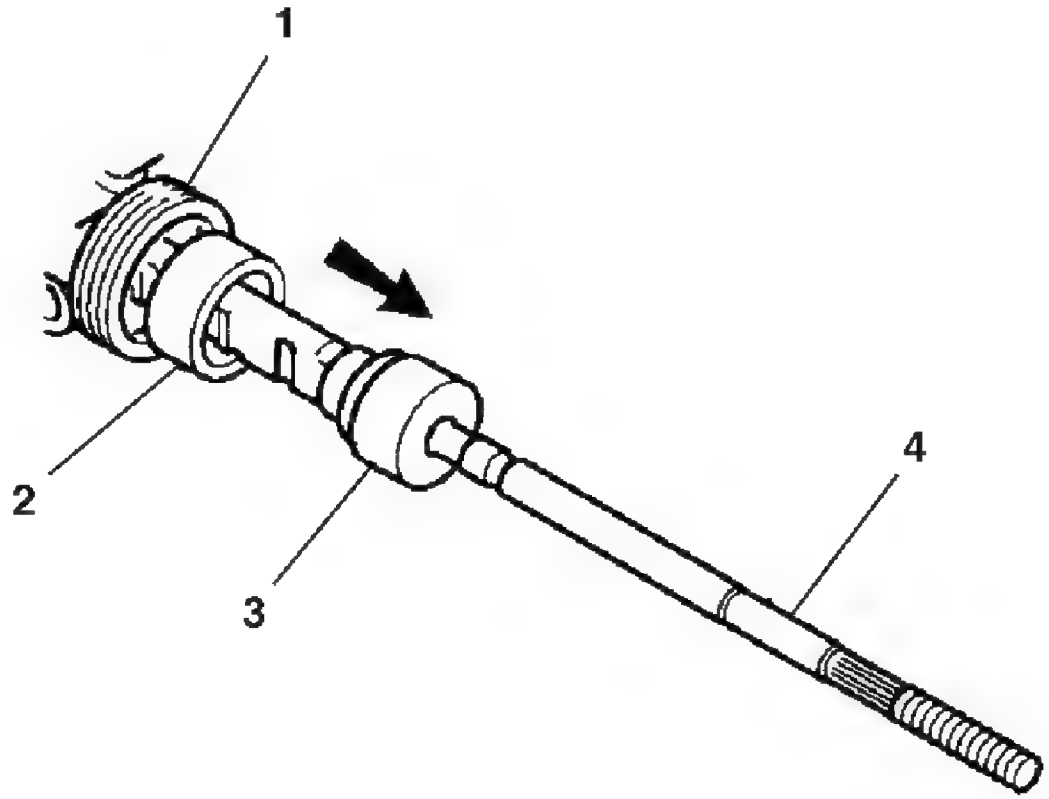


Fig. 101: Identifying Shock Dampener & Inner Tie Rod Housing
Courtesy of GENERAL MOTORS CORP.

14. Slide the shock dampener (2) over the inner tie rod housing (3) until the front lip of the shock dampener (2) bottoms against the inner tie rod housing (3).
15. To assemble the rack and pinion boot. Refer to **Steering Gear Boot Replacement - Off Vehicle**.

STEERING GEAR CYLINDER PIPE ASSEMBLY AND SEALS REPLACEMENT - OFF VEHICLE VEHICLE (QUIET VALVE)

Disassembly Procedure

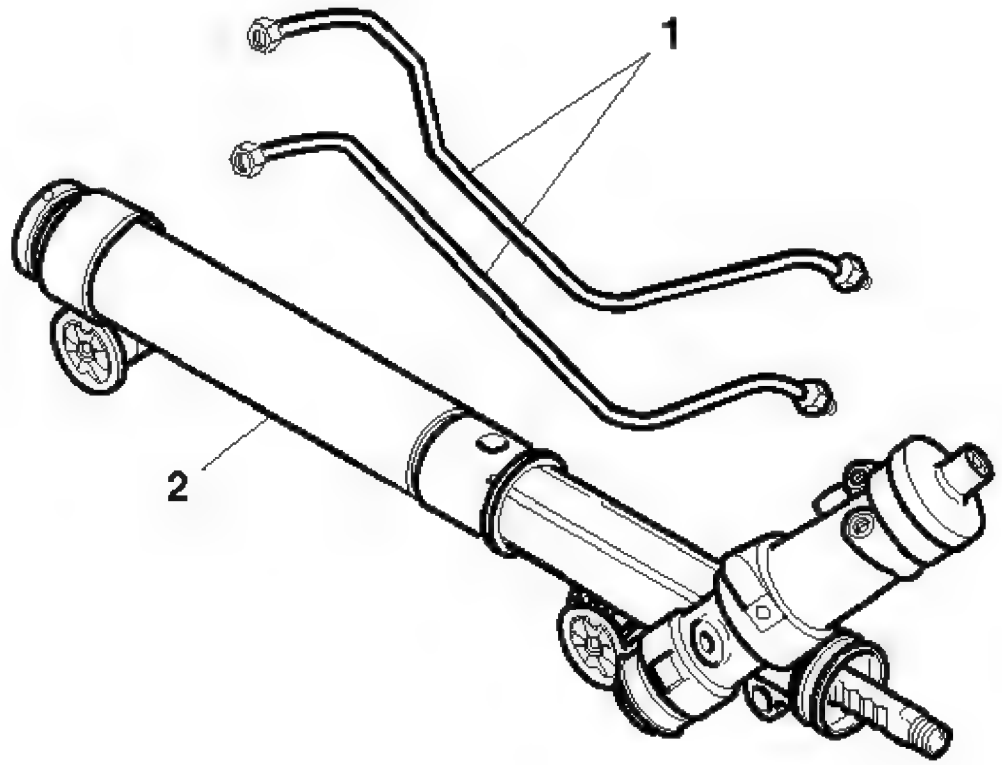


Fig. 102: Cylinder Line Assemblies & Rack & Pinion Gear Assembly
Courtesy of GENERAL MOTORS CORP.

1. Loosen both cylinder line fittings on the cylinder end of the gear assembly.
2. Loosen both fittings on the cylinder line assemblies (1) at the valve end of the gear assembly.
3. Remove both cylinder line assemblies (1) from the rack and pinion gear assembly (2).

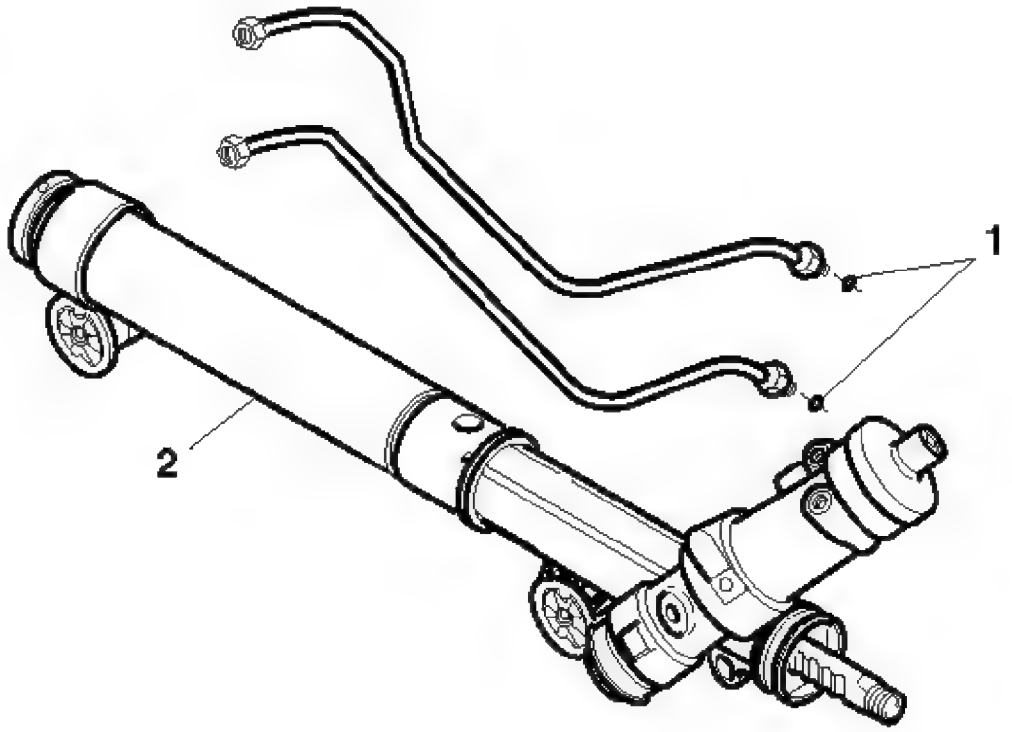


Fig. 103: View Of O-Ring Seals At Valve End Of Lines (Quiet Valve)
Courtesy of GENERAL MOTORS CORP.

4. Remove the O-ring seals (1) from the valve end of line.
5. Discard the O-ring seals (1).

Assembly Procedure

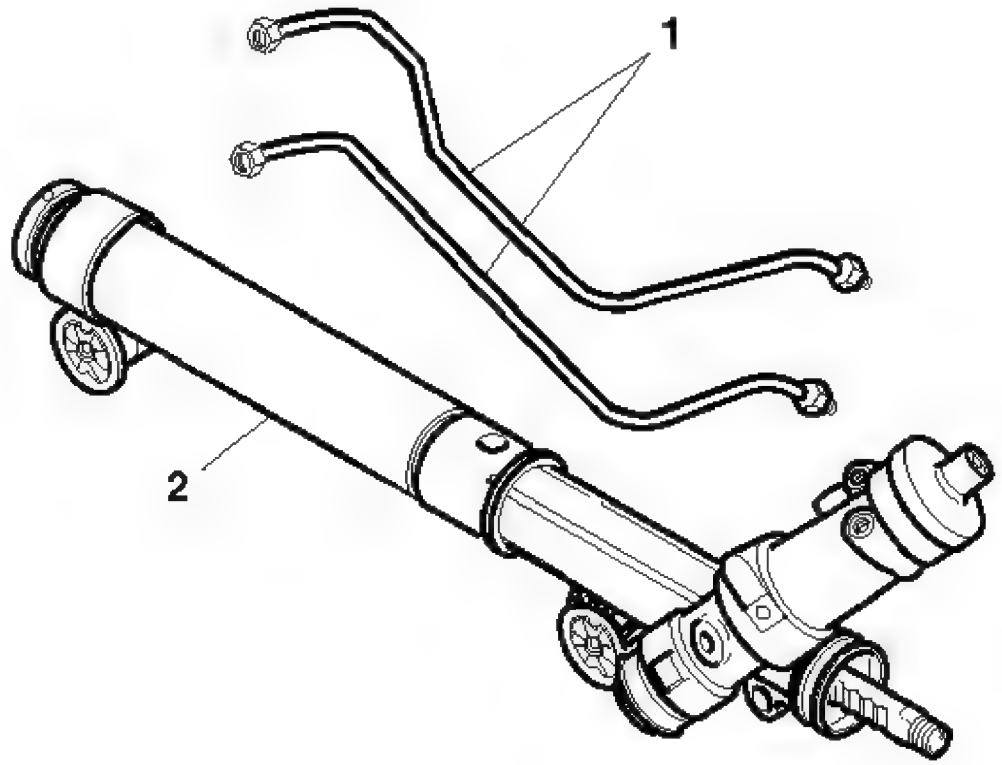


Fig. 104: Cylinder Line Assemblies & Rack & Pinion Gear Assembly
Courtesy of GENERAL MOTORS CORP.

1. Inspect the cylinder lines (1) for the following items:
   - Cracks
   - Dents
   - Damage to the threads
2. Replace the parts as needed.

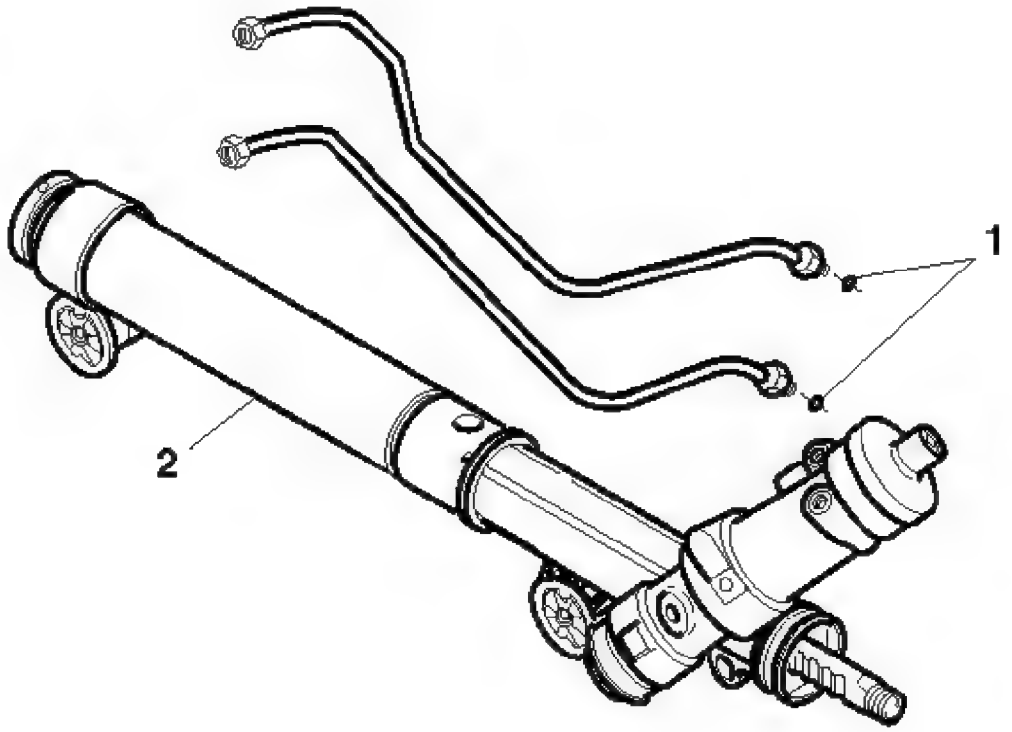


Fig. 105: View Of O-Ring Seals At Valve End Of Lines (Quiet Valve)
Courtesy of GENERAL MOTORS CORP.

3. Install the new O-ring seals (1) to the valve end of the cylinder lines.

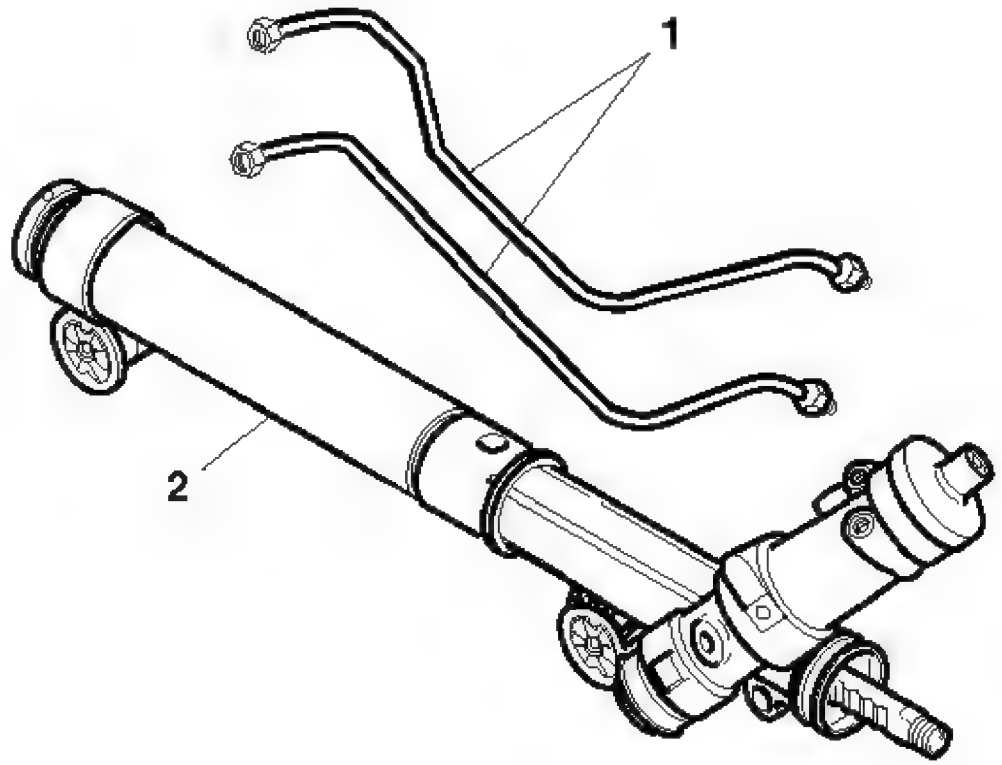


Fig. 106: Cylinder Line Assemblies & Rack & Pinion Gear Assembly
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

4. Install the cylinder line assemblies (1) to the gear assembly (2).

Tighten

- Tighten the valve end fittings to 17 N.m (13 lb ft).
- Tighten the cylinder end fittings to 27 N.m (20 lb ft).

DESCRIPTION AND OPERATION

POWER STEERING SYSTEM DESCRIPTION AND OPERATION (W/O ELECTRO-HYDRAULIC STEERING)

The hydraulic power steering pump is a constant displacement vane-type pump that provides

hydraulic pressure and flow for the power steering gear. The hydraulic power steering pumps are either belt-driven or direct-drive, cam-driven.

The power steering fluid reservoir holds the power steering fluid and may be integral with the power steering pump or remotely located. The following locations are typical locations for the remote reservoir:

- Mounted to the front of the dash panel
- Mounted to the inner fender
- Mounted to a bracket on the engine

The 2 basic types of power steering gears are listed below:

- A recirculating ball system
- A rack and pinion system

In the recirculating ball system, a worm gear converts steering wheel movement to movement of a sector shaft. A pitman arm attached to the bottom of the sector shaft actually moves one tie rod and an intermediate rod move the other tie rod.

In the rack and pinion system, the rack and the pinion are the 2 components that convert steering wheel rotation to lateral movement. The steering shaft is attached to the pinion in the steering gear. The pinion rotates with the steering wheel. Gear teeth on the pinion mesh with the gear teeth on the rack. The rotating pinion moves the rack from side to side. The lateral action of the rack pushes and pulls the tie rods in order to change the direction of the vehicle's front wheels.

The power steering pressure hose connects the power steering pump union fitting to the power steering gear and allows pressurized power steering fluid to flow from the pump to the gear.

The power steering return hose returns fluid from the power steering gear back to the power steering fluid reservoir. The power steering return line may contain an integral fin-type or line-type power steering fluid cooler.

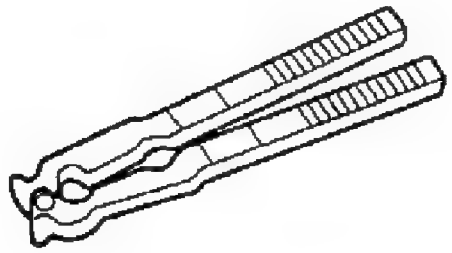
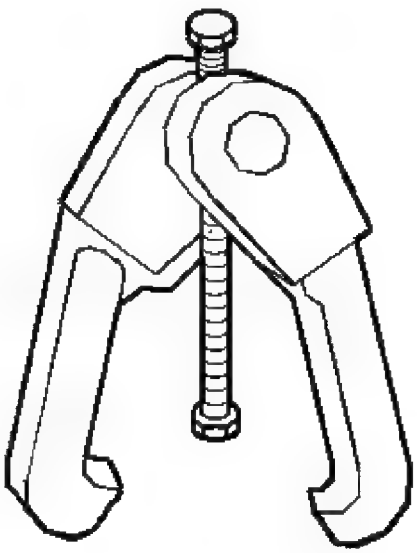
In a typical power steering system, a pump generates hydraulic pressure, causing fluid to flow, via the pressure hose, to the steering gear valve assembly. The steering gear valve assembly regulates the incoming fluid to the right and left chambers in order to assist in right and left turns.

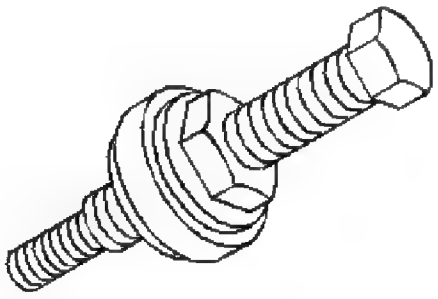
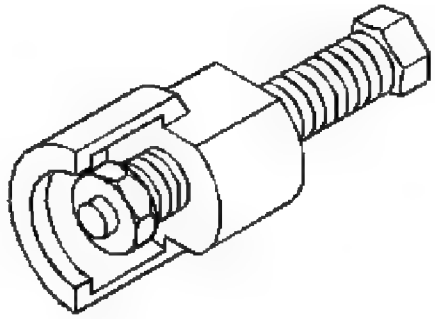
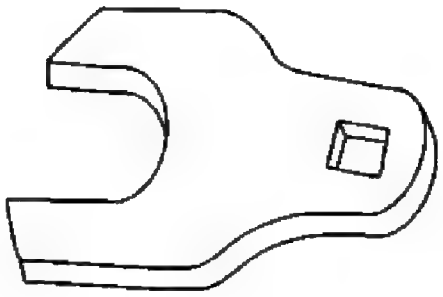
Turning the steering wheel activates the valve assembly, which applies greater fluid pressure and flow to 1 side of the steering gear piston and lower pressure and flow to the other side of the piston. The pressure assists the movement of the gear piston. Tie rods transfer this force to the front wheels, which turn the vehicle right or left.

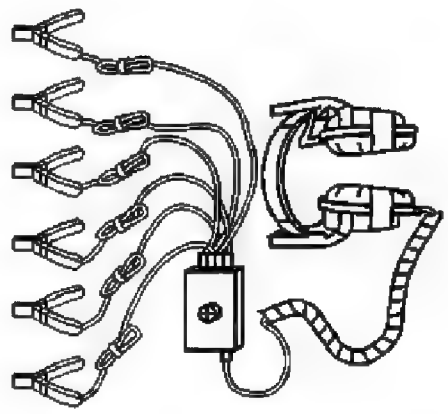
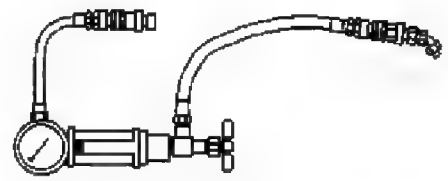
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/Description
	J 22610 Keystone Clamp Plier
	J 24319-B Steering Linkage and Tie Rod Puller
	J 25033-C Pulley Installer

	
	J 25034-C Pulley Remover
	J 34028 Inner Tie Rod Wrench

	J 39570 Chassis Ear
	J 42640 Steering Column Anti-Rotation Pin
	J 44721 Power Steering Analyzer

2006 Buick Lucerne CXS

2006 STEERING Power Steering System - Lucerne

2006 Buick Lucerne CXS

2006 STEERING Power Steering System - Lucerne

2006 Buick Lucerne CXS

2006 STEERING Power Steering System - Lucerne

2006 Buick Lucerne CXS

2006 STEERING Power Steering System - Lucerne